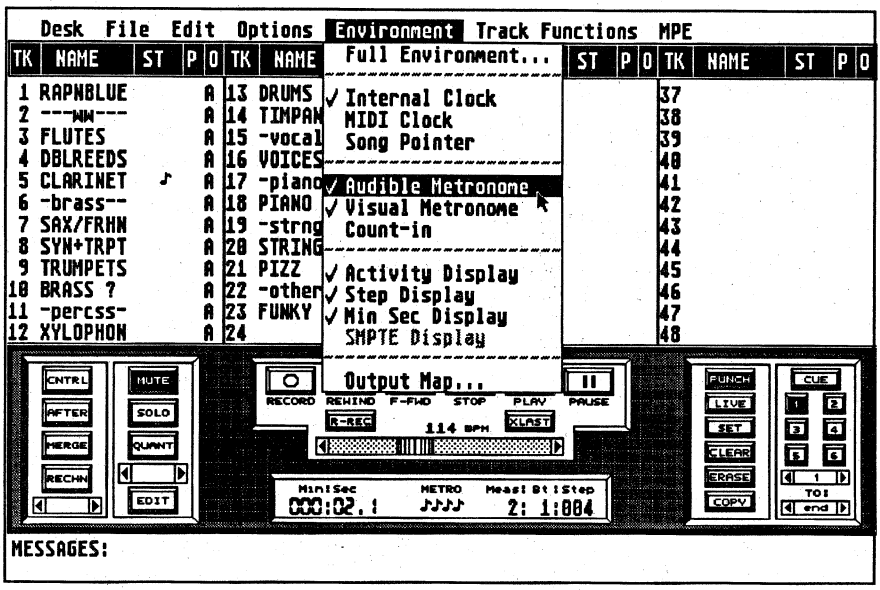
Dr. T's Presents



Dr. T's Keyboard Controlled Sequencer Version 4.0

For the Atari ST and Mega

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Chapter 1

Getting Started

Thank you for purchasing Dr. T's Keyboard Controlled Sequencer for the Atari ST. You now own the most powerful music processing program available at this time. Before reading this manual, check your disk directory for a file entitled README. If one exists, print or view the file before diving into the manual. This file contains any corrections or additions to this manual which were made after it went to press. This manual is current for version 4.0 of the KCS.

If you're an experienced KCS user, we suggest that you first turn to Appendix 3 for a quick discussion of all of the changes made in version 4.0. Otherwise, turn to Appendix 1 of this manual and read it carefully. This appendix contains important information on obtaining backups, warranty service, and customer support. We have made every effort to test the program and eliminate serious software bugs. Still, there is always some possibility that bugs exist. We suggest that you become thoroughly familiar with the program before using the sequencer on stage. Dr. T's Music Software assumes NO RESPONSIBILITY for losses caused by software errors or other problems in using the program!

Registration

Before you do *anything* else, fill out and mail the warranty registration card that came with the KCS. As soon as we get it, we'll send you a **free backup key disk.**

How to Use This Manual

The Keyboard Controlled Sequencer is a program which operates in two modes and performs several independent, yet interrelated, functions. Our philosophy in designing this program has been to give the musician a wide variety of methods for creating and manipulating music, while imposing a bare minimum of restrictions on the form of that music. This allows each user to develop a unique method of creating music, without regard to our own ideas of what form the music should or should not take.

In addition to this chapter, the manual contains two short tutorial chapters, chapters describing the six editing and play screens of the program, chapters on disk operations and the sequencer environment, and several chapters of application notes and general information. We recommend that you start by reading this chapter and the tutorials, followed by Chapter 4 (**OPEN and TRACK Mode Editing**) for more information on editing, and Chapter 9 (**Environment**) for information on the sequencer's operating parameters. Refer to the other chapters as the need arises. Once you become familiar with all the features of the Keyboard Controlled Sequencer, you will develop your own method of using it, depending on the equipment you are using and your own personal approach to music.

Program Overview

The Keyboard Controlled Sequencer provides two distinct modes of operation: *TRACK mode* and *OPEN mode*. In TRACK mode, the program acts as a 48 track tape recorder with many special functions that make it far more powerful than an actual tape deck. OPEN mode is a more generalized sequencing system which allows for completely independent looping of up to 128 separate sequences.

The two modes allow different approaches to be used for different pieces of music, depending on the requirements of the piece or the mood of the composer. An entire song can be done in TRACK or OPEN mode without ever going to the other mode, or a composition could be started in one mode, and completed in the other. Individual notes, phrases, sequences, or entire songs can be easily transferred between the two modes using special copy commands, or with cut and paste techniques. Sequences and tracks can also be merged, unmerged, split, or appended to other sequences or tracks.

Sequences and tracks can contain any type of MIDI data, including note data, continuous controllers, pitch bend, aftertouch, system exclusive messages, and real-time commands. Tempo changes can be added at any point in a track or sequence. In addition, OPEN mode sequences can contain events which start, stop, and otherwise influence other OPEN mode sequences. This provides a means for creating music of enormous complexity, or it can be used simply as an alternate method for creating traditional song structures.

Each mode has its own edit and play/record screens. While each edit screen has some unique features, many of the editing commands, as well as the overall operation of the Edit screens, are similar in both modes. The two Play screens each have their own special methods for interacting with a sequence as it is playing.

Program Overview (continued)

Which mode you choose for a given piece of music will depend on your level of familiarity with the program, as well as the requirements of the piece. Users who are familiar with the Commodore 64 or Apple II versions of the KCS will probably want to dive right into OPEN mode, to take advantage of its expanded structuring capabilities. If you are new to sequencing but are familiar with multi-track tape recording, you may want to work exclusively in TRACK mode until you have finished a couple of small pieces. Once you feel comfortable with TRACK mode, you can transfer your tracks to OPEN mode for assembly into songs with OPEN mode *control sequences.*

The KCS supports a number of load and save operations, for maximum flexibility in transferring music from one file to another. Individual tracks and sequences may be saved, all 48 tracks may be saved as a block, or the entire contents of memory may be saved. Of course, the KCS can also load and save standard MIDI files, and the settings of a number of important playback and record options can be saved in an "environment" file.

OPEN Mode Sequences

A sequence in OPEN mode may contain any type of MIDI data or commands to start or stop other sequences. Sequences are divided into two types, *primary* and *secondary.* There are 35 primary sequences, designated by the single numerals 1--9, and the letters A--Z. Primary sequences can be started and stopped from the OPEN mode Play screen by pressing the appropriate alphabetic or numeric key. The remaining 93 sequences are called secondary sequences and are designated by two digit numbers, from 00 through 92. These sequences may be started from the OPEN mode Play screen by pressing two digits on the numeric keypad. The playback of both primary and secondary sequences may be independently controlled in real-time using the computer keyboard, and as many sequences as desired can be played simultaneously.

The KCS contains two reserved sequences, sequence Y and sequence Z. Sequence Y is used from the Edit screens by the **Backup** function. The program will not let you create or edit sequence Y, but you may play or append an existing sequence Y. Sequence Z is used as an automatic backup for certain editing functions, and is not accessible to the user.

Using the Keyboard and Mouse

The Atari ST keyboard consists of a basic typewriter layout with a row of ten function keys above, a group of cursor control and editing keys to the right, and further right, a numeric keypad. Dr. T's Keyboard Controlled Sequencer uses the mouse to move the edit cursor, to access the various options on both Edit screens, to control playback from the Edit screens, and to control playback and recording in TRACK mode. Clicking the left mouse button selects the option under the mouse pointer or places the edit cursor at that point, while clicking the right mouse button, or both buttons at once, selects a play option. When we use the expression "Click the mouse on xxx", we are asking you to move the mouse pointer to xxx and then to click the left button. "Double-click" means to click the appropriate button twice in quick succession.

The computer keyboard is used heavily on the various play and record screens. The functions of the keys vary from screen to screen, and are described in detail in Chapters 5 through 7, and summarized in the Appendix. When selecting tracks or sequences on the play and record screens, numerals on the numeric keypad will <u>not</u> have the same effect as the numerals on the typewriter keyboard. Function keys <F11> to <F20> are accessed by pressing <Shift> and <F1> to <F10>. The function of the <F10> key is also duplicated throughout the program by the <Space bar>. In many cases, the <Return> and <Enter> keys will perform the same function, though there are some parts of the sequencer in which these keys act differently. Such instances will be pointed out in the manual, as well as the Appendix.

Edit Windows and Dialog Boxes

When selecting an edit operation or some other function in the KCS, it is often necessary to provide additional information to the program. Two methods are utilized to set the parameters for these operations. *Dialog boxes* are an element of the ST's GEM operating system, and are used to enter data for some functions, and *edit windows*, which were specifically designed for the KCS, are used by operations requiring more than a few data entries.

Dialog boxes, which are described in the manual that came with your ST, appear in the center of the screen when certain operations are selected. The box will contain two or more *exit buttons*, and possibly one or more areas for entering numeric data or text, called *data fields*. Clicking on a data field will place the cursor at the end of that field, and the <Backspace> and <Esc> keys can be used to clear the data field. When done entering data, click on the appropriate exit button. If one of the exit buttons is heavily outlined, it can also be selected by pressing <Return>.

Some dialog boxes may have *radio buttons* as well, which are used to choose one of several options. These buttons are similar to the buttons on a car radio, because selecting one will turn the previous selection off.

Edit windows are used by most operations which have more than two or three options to select. Some edit windows are quite small, while one, the Environment window, occupies the entire screen. Edit windows contain an assortment of radio buttons, data fields, and exit buttons, but look quite different from dialog boxes. The radio buttons are the cyan (blue-green) text areas which describe the various options, and are highlighted when selected. Some buttons are used to turn an option on or off (called toggling), while others are used to select one or another of a set of mutually exclusive choices (such as one of the three clock source options). Whether a button is a toggle switch or a radio button is usually obvious from its context, and is easily determined through experimentation. Exit buttons are always in upper case text only.

Data may be typed into the data fields, or you can enter values by holding the right mouse button down and "dragging" the mouse after selecting a value. If you hold the <Shift> key down, then moving the mouse will cause the value to change by large increments, or if <Control> is held down, moving the mouse will make the value jump to its minimum or maximum value. The <Clr/Home> key will clear a data field, *which is not always the same as entering zero.* The cursor control keys can also be used to move from one data field to another.

The exit buttons for the edit windows are the white text at the bottom of the edit window. The <Return> key duplicates **OK**, and the <Undo> key duplicates the **CANCEL** button. It is also possible to leave an edit window, and execute the appropriate operation, by holding down the <Shift> key while selecting any button in the window.

The Multi Program Environment

In addition to the functions described above, the KCS has a unique feature which allows you to extend its capabilities by adding additional program modules as you need them. This system, which we call the *Multi Program Environment*, or MPE for short, is described in detail in Chapter 10. Several MPE program modules are included with KCS version 4.0 as part of the Omega package, and are described in separate manuals included with the package. We also have several additional MPE modules which may be purchased separately.

Equipment Hookup

Depending on the equipment you have, there can be several ways to connect the various synthesizers, drum machines, sync boxes, etc. Basically you want to connect your recording synth or master keyboard's MIDI out to the computer's MIDI in, then connect the computer's MIDI out to the master synth's MIDI in. Your MIDI interface and any other special interface hardware, such as the Phantom SMPTE interface should be connected before turning on the power.

If you have more than one synth, you will need to connect any additional synths to the computer using a MIDI thru box, or the MIDI thru jack on your master synthesizer, if present. Assign each instrument to its own MIDI channel, and make sure that data reception is enabled on each instrument. If you want to use a drum machine or other MIDI clock source as a master clock while recording, you will need a MIDI merger to connect the computer's MIDI input to both devices simultaneously.

If you are using a MIDI expansion box (such as the Phantom or C-Lab's Export) to add additional MIDI outputs to your system, you should begin by connecting everything to the Atari's built-in MIDI output. Once you become familiar with the system, use the program's output port options to route sequences and tracks to the individual instruments or groups of instruments.

NOTE

When connecting your system, there are two common conditions to watch out for that can cause major headaches. The first is a MIDI loop, caused by routing the computer's MIDI out back to its input, either through a MIDI merger or a synth with a built in merge or echo function. The other condition is caused by the ST's slightly nonstandard MIDI output jack. While the MIDI spec calls for pins 1 and 3 of a MIDI connector to be left open, the ST uses these pins to provide a thru connection from the ST's MIDI in. Normally, this would not be a problem, but some manufacturers of MIDI cables also violate the MIDI spec and short these two pins to pins 4 and 5, which carry MIDI data. When used with the ST, these cables can cause data to become garbled, so check your cables carefully before using them. Worse yet, some instruments short these pins together at their MIDI inputs, so that even simple five conductor MIDI or DIN cables can cause the problem! If seemingly correct MIDI connections result in playback problems, check for these conditions. MIDI connectors are optically coupled, so a wrong connection will at worst result in no data transmission.

KCS and Level II

The KCS Omega package actually contains two versions of the KCS. The first, called KCS40.PRG, is a subset of LEVEL2.PRG. Level II has all of the features of the KCS itself, along with support for polyphonic aftertouch (or key pressure), and also incorporates our Programmable Variation Generator (PVG), a powerful tool for algorithmic, stochastic and/or deterministic sequence editing and generation.

Bear in mind that, even though Level II is the more advanced version, its additional features are not needed by all musicians, and it does use more memory than the KCS itself. If none of your instruments supports polyphonic aftertouch, if you are not intrigued by the Programmable Variations Generator, or if you are short on memory, we suggest that you stick with KCS40.PRG.

The additional features of Level II are described in a separate manual. In this document, the term KCS is used to refer to both programs.

Installing the KCS

If your ST system has a hard drive, you should begin by copying all of the files and directories supplied with the KCS Omega system to your hard disk. (If possible, you should put everything on the same drive, for the sake of convenience.) After you have copied all of the files, you should put all of these disks in a safe place, except for disk 1, which must be inserted in drive A when the program boots.

If you do not have a hard disk, you should start by making a copy of each of the disks supplied with the Omega package. With this done, put all of the originals in a safe place, except for disk 1, which must be inserted in drive A each time you run the KCS. **NOTE:** Do not use a disk copy program to copy Disk 1. Copy it "file by file" using GEM

Disk 1, which is also called a "key disk", can be removed from drive A once the program loads.

Starting the KCS

If you have installed the KCS on your hard drive, you may start it by first inserting disk 1 in drive A, then double-clicking on the icon labeled KCS40.PRG or LEVEL2.PRG, in the appropriate folder.

If you are running from floppies, insert the original copy of disk 1 (for KCS40.PRG), or the duplicate copy of disk 2 (for LEVEL2.PRG) in drive A, then open the disk by double-clicking on the icon for drive A, followed by the icon for the program.

Chapter 2

TRACK Mode Recording Tutorial

The purpose of this tutorial is to familiarize the first time user of the KCS with the program's TRACK mode Play/Record screen. The tutorial also provides an introduction to the Environment screen, and to transferring data between the modes.

If you have a multi-timbral synthesizer system, set it up with a four voice fuzz guitar or similar patch on channel 1, and a two voice dynamic bass on channel 2. Your recording keyboard should be set to play some sort of horn or other contrasting sound on channel 3. If your instrument is not multi-timbral, set its MIDI receive mode to Omni On/Poly (MIDI mode 1).

If your drum machine recognizes MIDI note messages as drum hits (most do), then set its mode to Omni Off/Poly, and its channel to 16. If it has programmable drum key assignments, set them according to the table on page 172; if not, it should work as is. If your drum machine can't be played via MIDI, set it to sync to MIDI clock, and select a plain vanilla 4/4 pattern.

Boot the program as described on page 10, and the TRACK mode Play/Record screen will appear. If your system is connected as suggested in Chapter 1, the sequencer is ready to record immediately. (If you are using a master keyboard and a set of expander modules, you will probably need to turn on MIDI merging, by clicking the mouse on the **MERGE** button in the lower left corner of the screen.)

Recording in TRACK Mode

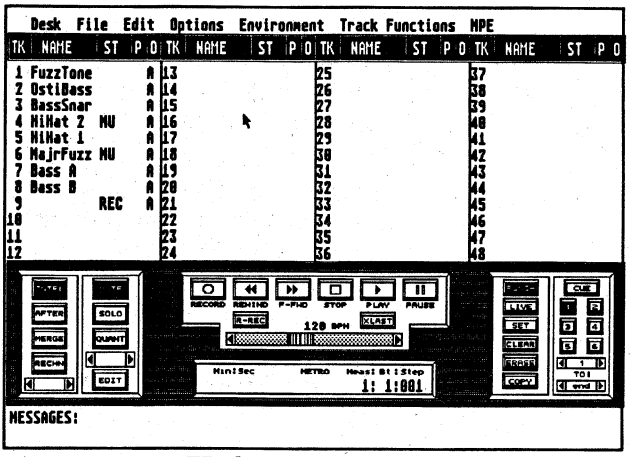
Play a few notes on your recording keyboard, and the sequencer will start to record. The metronome will start to tick, and the MIDI channel of the first MIDI message recorded will be displayed for track 1 in the upper left corner of the screen. Record a few bars of keyboard noodling, then press the <F10> key. The sequencer will continue to record to the end of the measure, and then loop back to the beginning of track 1. The material that you just recorded should now play back.

If you were to continue playing on your keyboard, recording would start on track 2, and both tracks would loop at the end of track 1. This process can be repeated for all 48 tracks, in much the same way that drum machines allow continuous overdub recording.

Loading and Playing Previously Recorded Tracks

Now let's see how TRACK mode works with existing pieces of music, by loading and playing a set of pre-recorded tracks. Insert the KCS key disk (disk 1) in drive A, pull down the **File** menu, and select **Open...**.

After you click on **Open...**, a file selector box will appear, with a list of the files on the program disk. Select the file named RECTUTR.ALL, then click on **OK**. When the file is loaded, click on the box beside **Play Screen** in the lower right part of the screen, and the program will return to the Play/Record screen, which should now look like this:



TRACK Mode Play/Record

The Play/Record screen is divided into two major sections: the *control panel* at the bottom of the screen, and the *track status* area, at the top. The control panel contains buttons for the most important TRACK mode recording functions, and there is a set of hidden controls for lesser used functions. The status area shows the status and name of all 48 tracks. A message line at the bottom of the screen displays messages regarding the status of various hidden controls, and other information.

Click the mouse on the **PLAY** button to start the sequencer. Six of the eight tracks in use will start to play. The **RECORD** button is still highlighted, which indicates that the sequencer is ready to record. We won't be recording anything for a while, so click on this button to disable recording.

The control panel contains other buttons which correspond to controls on a tape deck. The **PLAY**, **STOP**, and **PAUSE** buttons perform the obvious functions. **F-FWD** and **REWIND** cause the sequencer to zip ahead or back in the song. The tempo is displayed below the play control buttons, and can be set with the slider, or the arrows that bracket the slider. All of these controls are activated by clicking on them, just as if they were actual physical buttons. Experiment with these controls, then return the sequencer to **PLAY** status, at a comfortable tempo.

Muting and Shifting Tracks

Click the mouse on the display for track 1 in the status area, and the word **MU** will appear on that line, and the track will be silenced. Clicking on the track again, or pressing the 1 key on the computer's typewriter keyboard, will unmute the track.

Note that the **MUTE** button is highlighted. If **MUTE** is on, then selecting any track with the mouse will mute or unmute that track. Experiment with the **MUTE** function on the other tracks. (You might want to keep track 6 muted for now, as this track is in a different key than the others.)

After you get a feel for muting tracks, return each track to its original muted status (see the screen shot on page 13) and unmute track 4. This track is a slight variation on track 5, and doesn't contribute anything of interest, yet.

Now pull down the **Track Functions** menu and click on **Shift +12**. The **MUTE** light will go off, and the words **SHIFT 12** will appear on the message line. Click on track 4, and the hi-hat part will be augmented by a slightly delayed version of itself.

Click on track 4 again to increase the delay time. At this setting, it sounds less like an intentional delay and more like slop, so let's shift the track back one step. Pull down the **Track Functions** menu again, but this time select **Shift -12**. Click on track 4 once, to return it to its slightly delayed position.

Mute, Shift +12, and **Shift -12** are all part of a set of functions called *track functions.* A track function determines what will happen to a track when it is selected with the mouse or its track key. There are over a dozen different track functions, but only one can be turned on at any time. The track functions can be selected either from the **Track Functions** menu, with buttons on the control panel, or with keyboard equivalents. Another important track function which can be accessed from the control panel is the **Solo** option. Click on the **SOLO** button, and experiment with this track function on each track. Select **MUTE** when you have soloed every track, and they will all return to their original statuses.

Building a Song

Now let's copy these tracks into OPEN mode sequences, which will be assembled into a song using the Song Editor. The **All Tracks to Seq...** option will copy all unmuted tracks into a specified sequence. By muting various combinations of tracks and copying all tracks to a number of sequences, it's possible to build sections of a song in TRACK mode. We will use this technique to make a short song from these tracks.

Stop the sequencer, and mute tracks 1, 2, 4, 6, and 8. Pull down the **Options** menu and select **All Tracks to Seq..**, and an edit window labeled **ALL TRACKS TO SEQUENCE** will appear. This window allows you to specify a sequence number, name, and comments for the sequence. (For the moment, ignore the **Include Muted Tracks** button.) The sequence number defaults to the lowest empty sequence (in this case, sequence 2), and the comments field will show a list of the unmuted tracks. Click on **OK** or press <Return> to copy the unmuted tracks (tracks 3, 5, and 7) into sequence 2.

Now, using the method described in the last paragraph, copy the following track combinations into sequences 3 to 8:

Mute tracks 1, 2, 4, and 6, and copy the other tracks into sequence 3.

Mute tracks 1, 4, and 6, and copy the other tracks into sequence 4.

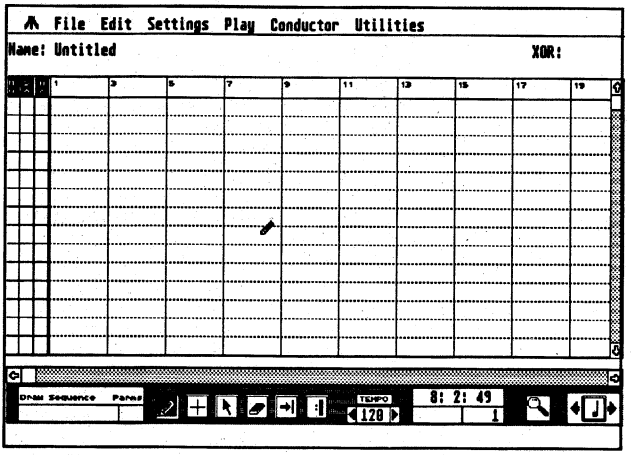
Mute tracks 4 and 6, and copy the other tracks into sequence 5.

Mute track 6 only, and copy the other tracks into sequence 6.

Mute tracks 1 and 6, and copy the other tracks into sequence 7.

Mute tracks 1, 5, and 8, and copy the other tracks into sequence 8.

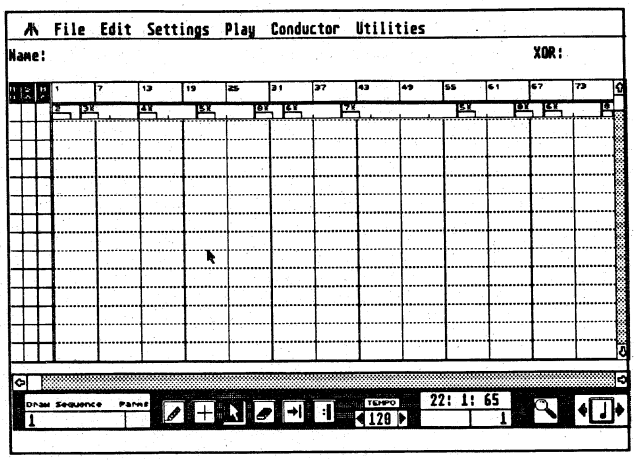
Now that we've created the parts to our song, we can load the Song Editor and use it to chain them into a song. The Song Editor is an MPE module, and must be loaded through the **MPE** menu before it can be used. If you are using a floppy drive, insert the working copy of disk 2 in drive A, then click on **Load...** in the **MPE** menu. (If you already installed the Song Editor on your hard drive, you do not need to insert a disk in your floppy drive, since the Song Editor is not copy protected.) Locate the file named SONGEDIT.INF, then select that file and click on **OK**. After a few seconds, the Song Editor, which is shown on the following page, will appear.



Song Editor

The Song Editor displays a graphic representation of the sequences used in a song. Songs are created by placing bars, which represent sequences, in the grid on the screen shown above. This process is described in the separate manual which covers the Song Editor, and is really beyond the scope of this tutorial. Instead, we'll take a shortcut, and load a file that contains a song that was made from the sequences that we just created. You could just as easily, however, go to the Song Editor and draw the sequence segments in yourself using the pencil tool to draw, and selecting which sequences to draw by clicking in the "Draw Sequence" box and choosing the appropriate sequence. Playing with this is great fun.

To load the song file, pull down the Song Editor's **File** menu, then click on **Open....** Our old friend the file selector will appear, which we will use to select and load the file SONGTUT.ALL, which is found on your key disk (disk 1). This file contains all of the sequences that we just created, as well as the song shown on the next page.



SONGTUT.ALL

This song can be used in a number of ways. It can be played directly from the Song Editor, which is certainly the most obvious thing to do, or it can be transferred back to the KCS for editing. In keeping with the spirit of this tutorial (which, after all, is about TRACK mode), let's copy the song to a set of tracks and then edit it there.

Back to TRACK Mode

Copying a song to TRACK mode is a two step process. First, the song must be converted to an OPEN mode sequence, and then this sequence must be converted to a set of tracks. (Quick thinking readers will note that this is the opposite of the procedure we used to create the song in the first place.)

To copy the song to OPEN mode, pull down the **Utilities** menu, then click on **Song to Sequence....** A dialog labeled **SONG TO SEQUENCE** will appear; click on **OK** to select the default sequence (sequence 9).

Now it's time to return to the KCS. This is absolutely painless in the MPE; just pull down the **File** menu, then click on **KCS**, and the TRACK mode Play screen will appear. Now pull down the **Options** menu, click on **Seq to All Tracks...**, and specify sequence 9 in the dialog that appears. (Don't change the button labeled **Clear Tracks First**). Finally, click on **OK**, and the song will be copied back to TRACK mode.

Finishing Up

Note that the eight original tracks have been compressed into four tracks--one for each channel used, and a "conductor" track (track 1) which sets the length of all tracks. Click on the **PLAY** button, and the song will start to play.

With the song "stretched out" into four long tracks, it is now possible to overdub tracks that are the length of the entire song. This allows you to add parts that are not locked into the repetitious patterns created by the original tracks, such as lead lines and drum fills.

The exact setup for recording tracks will vary depending on the keyboard/sound generator arrangement you are using. For the rest of this tutorial, we will assume that your recording keyboard is a single channel synthesizer such as a DX7 or a Mirage. If you are using some other arrangement see the sections on **MIDI Merge**, **Rechannelize**, and Local Control Off in Chapters 5 and 9, as well as your owner's manuals, for information on configuring your system.

Before starting to record, click on the **CNTRL** button. This enables the recording of MIDI controller information such as pitch bend, modulation wheel, and sustain pedal movements. Play along with the sequencer until you get an idea of what you'd like to record, then click on **RECORD**, and play your part.

Chances are, the first track that you record will not be to your liking. In this case simply press **UNDO**, or click on **R-REC** (re-record), and the track you are recording will be erased, the sequencer will then stop, and you can start over. Once you've recorded a good take, you will be ready to record another track in the same way.

By now, you should have a good idea of the basic technique of TRACK mode recording on the KCS. The TRACK mode Play/Record screen has many other features which have not been discussed here. At this point, you might want to record a short piece of your own, referring to Chapter 5 for more detailed information on the recording process; or continue with the OPEN mode editing tutorial, for a look at how the sequencer stores and manipulates musical data.

Chapter 3

OPEN Mode Editing Tutorial

The purpose of this tutorial is to familiarize the first time user of the KCS with the program's OPEN and TRACK mode Edit screens. The tutorial also provides introductions to the program's representations of various types of musical events, and to creating and editing control sequences. The "raw material" for the editing tutorial consists of three previously recorded sequences, which are to be loaded from disk.

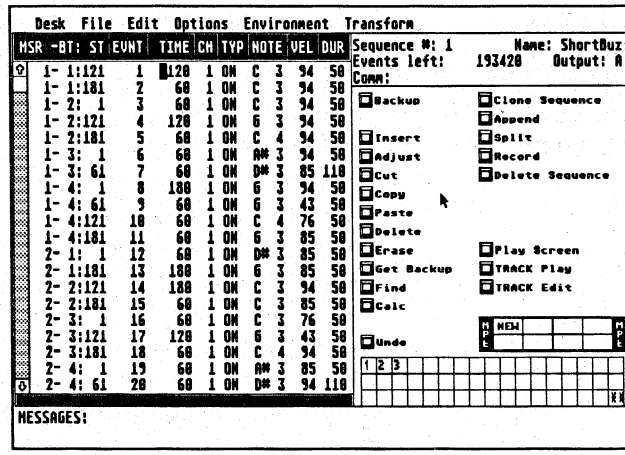
If you have a multi-timbral synthesizer system, set it up with a buzzy clav voice on channel 1, a bass on channel 2, and some type of reed or fluid lead synth sound on channel 3. If your synth isn't multi-timbral, set its MIDI receive mode to MIDI mode 1 (Omni On/Poly). If you have a drum machine, set it to synchronize to MIDI clock, disable the reception of MIDI channel messages, and select a simple 4/4 pattern.

Now boot the program as described on page 10, and you will see the TRACK mode record screen. Since we will be editing OPEN mode sequences, the first step is to move to the OPEN mode Edit screen. Click on the **EDIT** button in the lower left part of the screen, and the TRACK mode Edit screen will appear.

The TRACK mode Edit screen is very similar to the OPEN mode Edit screen, but only tracks can be edited in TRACK mode, not sequences. On the right side of the screen is a list of editing options. Click on the **OPEN mode** option, in the lower right corner, and the OPEN mode Edit screen will appear.

Now the sequences to be edited must be loaded in from the disk. Place disk 1 (the KCS key disk) in the disk drive, pull down the **File** menu and select **Open....** A file selector will appear, with a number of file names. Select EDTTUTR.ALL, then click on **OK.**

Once the file is loaded, the program will return to the Edit screen, which should now look like this:



OPEN Mode Edit

The Edit screen is divided into three major sections: the menu bar at the top of the screen, the edit options area on the right side of the screen, and the event list, on the left half of the screen. The event list displays the actual data which makes up the sequence, and the edit options are used to select the most commonly used editing operations, or to move to other parts of the program. Other editing options are found in the **Options** menu. There is also a message line at the bottom of the screen, which displays information and prompts when an edit option is selected, and a set of select boxes below the edit options, for moving to another sequence.

Moving Within the Event List

The edit cursor, the small solid square in the upper left corner of the event list, is used to select an event for editing, or to set the beginning or end of a range of events. It can be moved to any point in the event list by clicking on the new position, or it can be moved with the cursor control keys. Practice moving the cursor around the screen with both the mouse and the cursor control keys.

The Edit screen can only display 20 events at a time; other parts of the event list can be accessed by scrolling through the list with the scroll bar, located on the left edge of the event list. You can scroll the display one line at a time with the arrows at the top and bottom of the scroll bar, or you can move to any point in the list with the slider. Practice scrolling through the event list with these controls, then return to the top of the list.

Playing a Sequence

Before editing sequence 1, we want to play it through a few times to hear what it sounds like. Click on the box beside the words **Play Screen**, and the OPEN mode Play screen will appear. Press the <1> key on the QWERTY keyboard, and sequence 1 should start playing on MIDI channel 1. After listening for a bit, return to the Edit screen by pressing <F1>.

Sequence 1 sounds interesting, but is too repetitive, and is out of sync with the drum machine and metronome. To correct these problems, we will adjust the timing of the sequence, shorten it, and make a few changes to the second repetition of the sequence.

Before doing any editing on the sequence, it's a good idea to make a backup of the sequence. Click on the box next to the word **Backup**, and a confirmation message will appear in the message line. Clicking on **Get Backup** will swap the backup and the edited sequence, for quick comparisons. After you're sure you've done an editing operation correctly, make a new backup so that you won't have to redo the whole tutorial if you accidentally mangle the sequence.

Editing Individual Notes

The timing of the sequence is controlled by the data in the **TIME** field, which is the third column in the event list. Each entry in the **TIME** field represents the number of clock steps which go by before the remainder of that event occurs. One quarter note equals 240 clock steps, so a **TIME** value of 120 means that an eighth note's worth of time goes by before the first note in this sequence plays; in other words, this sequence starts on an offbeat, namely the second half of the first beat of the measure. This is why the sequence doesn't sync properly with the metronome and drum machine. This can be easily fixed by changing the first **TIME** value in the list to zero.

Place the edit cursor over the first digit of the first value in the **TIME** field, type a space, and look at the screen. The box which now outlines the first event indicates the data that can be edited. The <Cursor Left> and <Cursor Right> keys, as well as the <Tab> and <Shift-Tab> keys, can be used to move the edit cursor within the box; experiment with these keys a bit, then place the cursor over the 2 in the **TIME** field, type 0, and press <Return> (*not* <Enter>).

When <Return> is pressed, all the entries in the **MSR-BT:ST** field will change. This field marks the location of each event in measures and clock steps. Note that the **MSR-BT:ST** field now reads 1-1:1 for the first event, which means that the first note now occurs on the first step of the first beat of measure one.

Deleting a Range of Notes

Since the essential theme of this sequence repeats every measure, we can delete all but the first measure of the sequence. The first event of the second measure is event 13; the event number is listed in the **EVNT** field. Click on event 13, then while holding the mouse button down, move the mouse pointer all the way down to the area between the end of the event list and the message line. The list will scroll down when the pointer moves below the event list; when the highlight reaches the last event (event 43) in the sequence, release the mouse button. The highlighted region has now been selected for editing.

The highlighted portion of the sequence can be played by clicking the right mouse button. Do this now, and note that the measure/beat/step display and a message appear at the bottom of the screen.

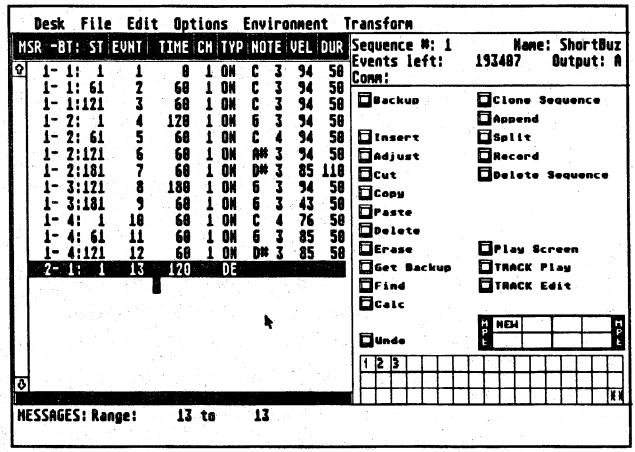
Now click on **Delete** in the edit options area, and the highlighted notes will disappear. If you've made a mistake at this point, you can "undo" the **Delete** operation by clicking in the **Undo** box in right half of the screen. Click here now, even if you didn't make a mistake, and then click on **Undo** a second time to retrieve the edited sequence. This works because clicking on **Undo** swaps the edited and unedited versions of the sequence.

Extending a Sequence

Return to the OPEN mode Play screen by clicking on the **Play Screen** box, and press <1> on the typewriter keyboard. The sequence starts okay, but loses sync at the start of the first repetition; something is obviously not right. Press <F1> to return to the Edit screen, and look at the data in the **MSR-BT:ST** field. The sequence ends on measure 1, beat 4, step 121, which makes it three and a half beats (840 steps) long; but a full measure of 4/4 time at 240 steps per beat is four beats (960 steps). The sequence must be extended by half a beat, or 120 steps, if it is to synchronize properly with the drum machine.

Extending a Sequence (continued)

To add an event to the end of the sequence, place the cursor in the **TIME** field immediately below the last event in the list, and enter 120. Move over to the **TYP** field and type DE, then press <Return>. The screen should now look like this:



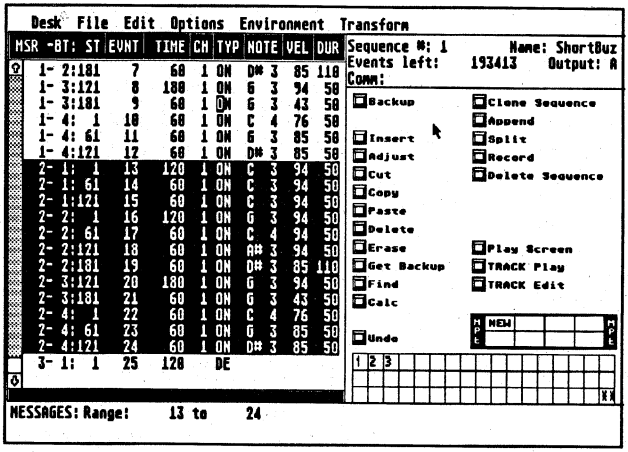
Deleted (DE) Event

The data in the **TYP** field indicates the event type. All the events up to this point have been ON events, which represent note-on and note-off messages. ON events make up the majority of most sequences. The DE event is a "deleted event", a dummy event in which nothing occurs except the passage of time. When used at the end of a sequence, it sets a time delay between the occurrence of the previous event, and the start of the next sequence. Go to the Play screen and play sequence 1. Everything should sync properly now.

Upon listening to the sequence, it seems that it might make a bit more musical sense to double its length and make a slight change to the second half. We'll do this by first copying part of the sequence into the paste buffer, and then pasting it at the end of the original sequence.

Since there is no need to duplicate the DE event, we only need to copy events 1 to 12 into the paste buffer. Place the edit cursor on event 12, and highlight the events from 1 to 12 by holding the mouse button down and moving the mouse pointer to event 1. (This is known as "dragging" the mouse.) Click on **Copy**, and an edit window will appear on the screen. The default parameters will work for this operation, so click on **OK**. These events are now stored in the paste buffer.

Move the edit cursor to event 13, and click on **Paste**. A rather complex edit window will appear; for the moment, just confirm that **Insert** is selected in the upper left corner, and enter 120 for **First Event Time.** This is to make up for the DE event and its associated **TIME** value that weren't copied. Click on **OK**, and the screen should now look like this:



Edited Sequence

If your sequence doesn't end with a DE event on **MSR-BT:ST** 3-1:1, retrieve your backup copy and go through the cut and paste procedure again.

Erasing an Event

The last step in editing sequence 1 is to make a slight change in the second measure by erasing the last note in the sequence. Place the edit cursor on event 24, and click on **Erase**. When the edit window appears, click on **OK** to erase event 24. **Erase** is similar to erasing a small section of a tape recording, and doesn't affect the timing of the sequence, while **Delete** is more like cutting out a piece of the tape, since the sequence is shortened when events are deleted.

Playing Multiple Sequences

Now go to the OPEN mode Play screen, and start sequence 1. Watch the measure-step display and, while the measure is an even number, press <2> on the QWERTY keyboard. This will start sequence 2 at the start of the next measure. This simple three note bass line fits with sequence 1, but the timing is a bit rough.

Return to the Edit screen and move to sequence 2 by clicking on the box labeled 2 at the bottom of the right part of the screen. Note that while the **TIME** values in sequence 1 were all multiples of six, this is not true for sequence 2. This can be fixed with the **Quantize...** option.

Quantizing (Auto-correcting)

Pull down the **Transform** menu, and then click on **Quantize...**, and an edit window will appear. Enter 60 in the space labeled **Time Quantize**, and then click on **OK**, at the bottom of the edit window. The sequence is now auto-corrected; the four values under **TIME** should be 0, 1920, 60, and 1860.

Now let's return to the Play screen and cue sequences 1 and 2 to start together. Press <Esc> to pause the sequencer. The word **PAUSE** will appear above **ALIGN**; press <1> and <2> to select these sequences, and press the <Esc> key a second time to turn off **PAUSE** and start the sequencer. After listening to this for a bit, wait for an even numbered measure and press <3> on the typewriter keyboard to start sequence 3. This lead line was recorded using quite a bit of mod wheel and foot pedal motion, perhaps too much; but the notes themselves are okay. The best thing to do is probably to strip the controller data from the note data, and to re-record the controllers at a later time.

Continuous Controllers

Return to the Edit screen by pressing <F1>. Sequence 3 looks a little different from the earlier sequences because of the mod wheel and foot pedal data it contains. The CC events represent data from these and other continuous controllers. The value under **NOTE** is the MIDI controller number for that event (1 for mod wheel, 4 for foot pedal), and that under **VEL** is the value of that controller. Scroll through the sequence, and note two facts: first, that continuous controllers use up much more memory than notes do, and second, that the many CC events make it difficult to view and edit the ON events.

CC events can be deleted from a sequence using the **Erase Controllers...** option, which is found in the **Transform** menu. Go to the **Transform** menu, then click on **Erase Controllers...** and, when the edit window appears, click on **OK**. Sequence 3 should now look like the event list shown on the following page.

Desk File Edit Options Environment Transform

MSR	-BT: ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
4-	4:231	1	3030	4	ON	G 3	1	999
6-	4:131	2	1820	4	ON	A# 3	68	60
6-	4:191	3	60	4	ON	C 4	76	60
7-	1: 1	4	50	4	ON	G 3	58	999
8-	4:221	5	1980	4	ON	C 4	41	990
9-	4:231	6	970	4	ON	D# 4	56	810
10-	4: 71	7	800	4	ON	F# 4	54	190
11-	1: 11	8	180	4	ON	G 4	60	999
12-	4:191	9	1860	4	ON	A# 4	60	30
12-	4:211	10	20	4	ON	C 5	76	999
14-	4:111	11	1820	4	ON	A# 4	60	130
15-	1: 1	12	130	4	ON	G 4	72	999
16-	4: 81	13	1760	4	ON	F 4	64	170
17-	1: 1	14	160	4	ON	G 4	60	999
18-	4: 91	15	1770	4	ON	F 4	46	40
18-	4:131	16	40	4	ON	G 4	84	40
18-	4:161	17	30	4	ON	F 4	64	40
18-	4:201	18	40	4	ON	C 4	72	999
22-	4:171	19	3810	4	ON	G 5	76	50
22-	4:191	20	20	4	ON	C 6	64	999

Sequence #: 3 Name: Lead
Events left: 193367 Output: A
Comm:

Backup
Insert
Adjust
Cut
Copy
Paste
Delete
Erase
Get Backup
Find
Calc
Undo
Clone Sequence
Append
Split
Record
Delete Sequence
Play Screen
TRACK Play
TRACK Edit
NEW
1 2 3
**

MESSAGES:

Sequence 3, Notes Only

The note data from the lead synth part is much easier to read with the controller data eliminated, and can be edited more easily as well.

Creating a Control Sequence

Now that we've got all three parts edited, let's combine them into a short song. This is done using primary sequence start events in a separate OPEN mode sequence known as a control sequence. Primary sequence start events are represented in the event list by the number or letter of the sequence, and the **NOTE, VEL,** and **DUR** fields are used to indicate the pitch transposition, velocity transposition, and number of repeats for that sequence.

We will create the control sequence in sequence A, which doesn't exist yet, and therefore is not shown in the select boxes at the bottom of the edit options area. To get to a sequence that isn't shown here, click on the ** symbol in the last select box, and enter A in response to the prompt. Place the cursor on the single DE event, then click on **Insert.** When the box appears, type in the following data, pressing <Return> after each line and moving the edit cursor up or down with the cursor control keys after the last line.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		1	0	-20	2W
1-	1:	1	2	0		1	0	0	4
1-	1:	1	3	0		2	0	0	2W
1-	1:	1	4	0		3	0	0	1
1-	1:	1	5	0		1	0	0	24
1-	1:	1	6	0		2	0	0	12W

The W's in the duration fields are Wait flags, which cause playback of the control sequence to wait until the sequence in that line is done playing. In this example, starting sequence A will start sequence 1 immediately; when sequence A reaches the W at the end of the line, sequence A will pause until sequence 1 finishes its two repetitions. After waiting for the **TIME** value of zero steps, sequences 1 and 2 will start and run for 2 repetitions of sequence 2; after which sequences 1, 2 and 3 will start together. The -20 in the **VEL** field for event 1 causes sequence 1 to play its note velocities 20 units lower than normal.

This sequence can be played from the OPEN mode Play screen just like the others were, but there is another method for playing sequences that is more convenient when editing. Place the edit cursor on the first event, and click the right mouse button; the sequence will play from the first event. Clicking the mouse button will stop the sequence. The sequence can be played from any event by placing the edit cursor on that line and right clicking, which makes it easy to listen to just part of the sequence.

This tutorial has by no means covered the full range of edit options available on the KCS, but you should now be familiar enough with the sequencer's operation to get started making some music. More details on editing can be found in Chapter 4.

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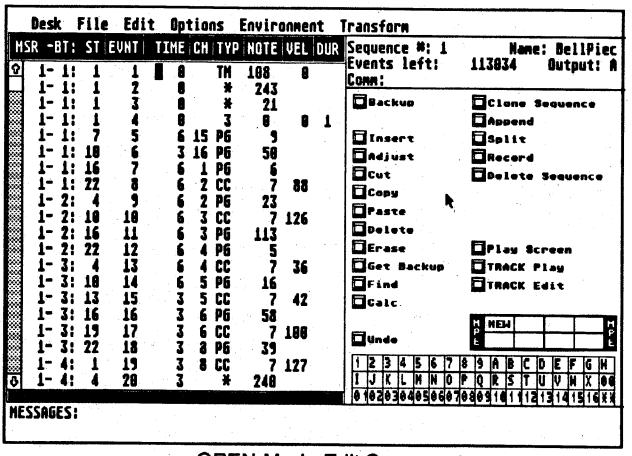
Chapter 4

OPEN and TRACK Mode Editing

The OPEN mode and TRACK mode Edit screens let you make individual or global changes to pitch, duration, velocity, MIDI channel, and timing for all notes in a sequence or track. Notes and other MIDI events can be edited individually, copied to another point in the same sequence or track, or copied to another sequence or track. New events can be typed in from the computer keyboard, or can be entered in step-time using a MIDI keyboard in conjunction with the computer's keyboard. In many ways, the KCS's Edit screens act as a word processor designed for music. In addition, the Edit screens are used to access the computer's disk drive(s), to set the sequencer's operating options, and to move from one mode to the next.

The Edit screens for OPEN and TRACK modes are quite similar, though each mode has a few commands not shared by the other mode. The OPEN mode Edit screen is shown below.



OPEN Mode Edit Screen

The Edit Screen

The Edit screen is divided into four sections: the *event list* on the left half of the screen, the *edit options* on the right side, the *message line* at the bottom of the screen, and the *select boxes*, below the edit options. The event list displays up to 20 events (notes, program changes, control changes, etc.) of the currently selected sequence or track, and is where the actual editing takes place. The edit options section is used in conjunction with the **Options** menu to select the editing operation to be performed, and also contains options for changing modes, and copying data from one mode to another. The edit options section contains the most frequently used edit options, while the **Options** menu contains less frequently used options. The message line is used to display messages about certain editing options, and to ask for more information about other options. The select boxes are used to select a different sequence or track.

There are also two cursors on the Edit screen: the mouse pointer, and the *edit cursor*. The mouse pointer indicates the current position of the mouse, as in all ST programs, while the edit cursor indicates the point at which editing will take place, or from which playback will begin if the right mouse button is clicked.

The Event List

The event list consists of five editable data fields, two fields whose contents are determined by the program, and a set of icons for scrolling the list. Here is a description of each of the fields:

MSR-BT:ST: The measure, beat and step at which the event occurs. For example, 2-1:1 means the first step on the first beat of measure two; 1-4:13 means the thirteenth step of the fourth beat of the first measure, etc. This is computed by the program and cannot be changed.

EVNT: The number of the event. **EVNT** is used to specify a range of events in the sequence or track when you are using the various edit options. This is also computed by the program and cannot be changed. A maximum of 9999 events can be listed properly in the **EVNT** field. If a sequence or track contains 10000 or more events, event numbering wraps around to 0. For example, event 12999 is shown as 2999, etc.

TIME: The time at which this event occurs in relation to the start of the previous event. Time is measured in steps of the internal or MIDI clock. Changing the current value will move this event and all subsequent events forward or backward in time (with the exception of entries followed by the <Enter> key, as described on page 40). The range of permissible values is 0 to 65535.

CH: The MIDI channel of the event. The **CH** field is not used for non-MIDI events, or for MIDI events which don't carry channel information. Channel numbers must be between 1 and 16.

TYP: The event type. The KCS uses over twenty different event types, which are explained later in this chapter. The most commonly used event type is the note-on event, which has a **TYP** value of ON. The meaning of the data in the next three fields is dependent on the data in the **TYP** field, so the names of these fields are only meaningful for a note-on or note-off event.

NOTE: The note value and octave, where the lowest note on a five octave keyboard is C2. Since computer keyboards don't contain flat symbols, flats are specified as the corresponding sharps (B flat 3 becomes A#3, for instance.) The range of valid MIDI notes in the KCS is C-1 to G9, though some other companies, most notably Yamaha, number MIDI notes from C-2 to G8.

VEL: Key velocity. The permissible range is 0--127.

The Event List (continued)

DUR: The duration of the note, or how long the key was actually held down. The range for duration is 1--999. A duration of 0 produces a note-on with no corresponding note-off, which is useful for creating notes with durations greater than 999 clock steps.

Scrolling through the event list is accomplished with the scroll bar on the left edge of the screen. You can continuously scroll the list by holding the mouse button down over either the up or down arrows.

The edit cursor may be moved to any point in the event list using the cursor keys, or by clicking the mouse on the appropriate point in the list. Note that the edit cursor cannot be moved into either of the noneditable fields (**MSR-BT:ST** and **EVNT**), so clicking the mouse on these fields has no effect. The edit cursor may disappear from the screen when scrolling, but its location will be unchanged. Note that, if you start to type or if you use the cursor control keys when the edit cursor has been moved off the visible portion of the screen, the display will immediately jump to that section of the event list.

Select Boxes and Edit Options

The select boxes, which are the small numbered boxes stacked at the bottom of the right half of the screen, are used to select a new sequence or track for editing. In TRACK mode, each of the 48 tracks has its own box. Tracks which contain data are shown as boxes with a number in them, while empty tracks are represented by an empty box. Clicking on a box will select that track for editing, or clicking on ** will allow you to type the track number.

Two sequences or tracks can also be swapped using the select boxes. Holding the left or right <Shift> key down when clicking on a select box will exchange that track or sequence with the currently selected track or sequence. This method can also be used to move a track or sequence to an unused location, by <Shift> clicking on an empty select box.

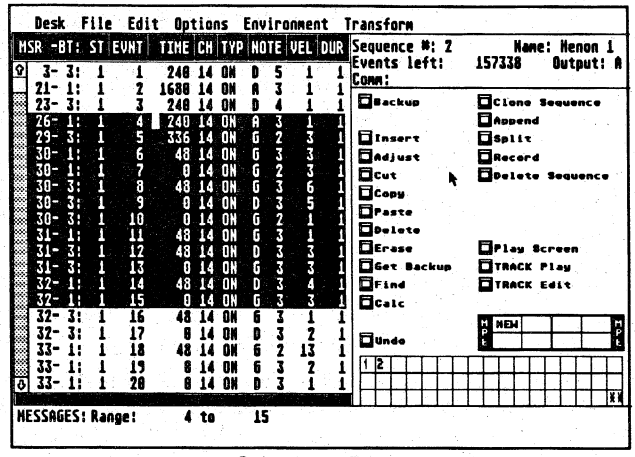
In OPEN mode, only the first 33 primary sequences (A--X and 1--9) and the first 26 of the secondary sequences (00--25) can be accessed with the select boxes. Sequences Y and Z are reserved for use by the program and can't be directly edited. Secondary sequences above 25 must be selected by clicking on ** and typing the sequence number.

The edit options are displayed on the right half of the screen. An option is selected by clicking on its name. Depending on the option chosen, a message, edit window, or dialog box may appear. The specific details on each option are explained later in this chapter.

While most of the edit options are identical in both TRACK and OPEN modes, there are slight differences in some cases, and some options appear only in one mode or the other. If this is the case, it will be noted in the section on that option.

Selecting a Range for Editing

Most of the edit options will work on a range of events, as well as a single event. The range can be entered in the dialog box or edit window for that option, or a range may be selected with the mouse. To select a range of events for editing, place the edit cursor at the top or bottom of the range, and while holding the left mouse button down, move the edit cursor to the other end of the range. (This is called "dragging" the edit cursor.) The selected range will be highlighted, as shown on the following page.



Selecting a Range

You can drag the cursor beyond the top or bottom of the screen, and the event list will automatically scroll to the new position. You can also create very long ranges by positioning the cursor at either end of the range, moving to the other end with the scroll bar, and then <Shift> clicking on the first (or last) event. The selected range can be played by clicking the right mouse button.

After a range is selected, a new range may be selected in the same way, and the active select range can be toggled between the two by pressing the <Alternate> key. If a range extends over more than a single screen, you can move from one end of the range to the other by pressing the <Control> key.

When a range is selected, the first and last event numbers of that range will be displayed on the message line.

Playing from the Edit Screen

In addition to the **Play Screen** option found on both Edit screens, the KCS allows you to play part or all of the sequence or track being edited using the mouse buttons. On both the TRACK mode and OPEN mode Edit screens, a single right click on the mouse will play the selected sequence or track, starting at the location of the edit cursor (even if the edit cursor is not visible on the screen). If a range has been highlighted, a single right click will play only the highlighted events. Note that this occurs even if the selected range has been scrolled off the screen. If a single right click does not produce the expected results, check the message line to confirm that the proper range is selected.

A double right mouse click will transfer you directly to the TRACK or OPEN mode Play screen. If the program seems to have a problem distinguishing single and double clicks, you can also move to the Play screen by holding down the <Shift> button while right clicking. The <F1> key will also take you back to the Play screen from the Edit screen.

In OPEN mode, pressing the left and right mouse buttons simultaneously will play the currently selected cue. In TRACK mode, all unmuted tracks will be played starting at the cue point, or if a range is selected, that range will be played for the selected track, as well as all other unmuted tracks.

To stop the sequencer when playing from the Edit screen, click the left mouse button. Holding the <Shift> key when doing this will place the last event played about 2/3 of the way down the edit list, which is handy when you need to locate a specific event by ear.

When playing from the Edit screen, the internal clock is always used, even if **MIDI Clock** or **MIDI w Song Pointer** is selected as the clock source on the Environment screen.

Editing or Entering a Single Event

To change a value in the event list, move the edit cursor to the location of the value, and type in the new value. When you start to type, a white box called the *edit box* will outline the fields you may edit. You can use the cursor control and <Backspace> keys to move over characters in the field and the <Space bar> to clear them out. The <Tab> key will move the cursor to the next field, and <Shift-Tab> will move the cursor back one field. The cursor can also be moved to any point within the edit box by clicking the mouse on that point. When you're done entering data, press <Return> to enter the data, or <Undo> to cancel the change. Clicking the mouse outside the edit box has the same effect as pressing <Return>.

Since the program expects to see only certain types of data in each field, (numbers from 1 to 16 in the **CH** field, for example), entering invalid data in a field will cause your entry to be misinterpreted or ignored. You must enter data that is appropriate for the type of event that you are editing.

To add notes to the end of a sequence or track, place the edit cursor in the **TIME** field on the first line after the end of the sequence or track, and enter the data as described above.

In most cases, the <Return> and <Enter> keys perform the same function in the KCS, but there is one important difference between these two keys when editing events. If the **TIME** value for an event has been changed and the <Enter> key is pressed instead of <Return>, the time of the next event will be adjusted so that the measure and step of that event will remain the same. See the section on **Insert** and **Adjust** for more details.

Defaults and Shortcuts for Event Editing

If a field is left empty when editing or entering a note or other event, then the value in that field will default to some value which depends on the event type and other factors. If all fields are left blank, and the previous line in the event list is an ON event, then each field will default to the value in the previous line, except the **TIME** field, which always defaults to zero. If the previous event is not an ON event, the defaults are not always predictable. Usually, the **TYP** field defaults to the value in the previous line, and all other empty fields default to zero. If the octave number in a note-on event is left blank, the default is the octave in the previous line; the same holds for octave values entered without notes.

There is also a group of single letter abbreviations for commonly used **TIME** values. Typing any of these abbreviations while the cursor is in the **TIME** column will cause the program to immediately display the selected time in the **TIME** column. The **TIME** abbreviations and the corresponding number of steps using the system default of 240 steps/quarter note are given in the following table:

Key	Value	Steps	Dotted	Triplet
A	Last used			
C	Last calculated			
Z	Zero	0	0	0
W	Whole note	960	1440	640
H	Half note	480	720	320
Q	Quarter note	240	360	160
E	Eighth note	120	180	80
S	16th note	60	90	40
T	32nd note	30	50	20

The "last calculated" value associated with the abbreviation "C" refers to the value returned by the most recent use of the **Calc** edit option, described on page 59.

A dotted note of any of the types listed can be entered by pressing <Control> and the letter at the same time. A triplet is entered by pressing <Shift> and the letter. Changing the **Steps/Beat** setting, on the Environment screen, will change the number of steps for each letter in the table correspondingly.

Event Types

The KCS recognizes 22 different types of events. Seven of these are MIDI events and the rest are non-MIDI. A sequence or track may contain different types of events. The MIDI events that the Keyboard Controlled Sequencer recognizes are:

ON--Note-on
OF--Note-off (also entered as OFF)
PG--Program change
CC--Control change
AT--Aftertouch, or channel pressure
PB--Pitch bend
* --Single byte event

The non-MIDI events are:

Primary sequence start (1--9, A--Z)
ST--Secondary sequence start
XX--Sequence stop
XL--Loop stop
MS--Mute sequence
US--Unmute sequence
PT--Transpose sequence pitch
VT--Transpose sequence velocity
TM--Tempo value
AC--Accelerando (increase tempo)
DC--Decelerando (decrease tempo)
SM--Steps/measure
RA--Random event
CU--Wait until cue
DE--Deleted event (rest)

Primary, ST, XX, XL, MS, US, PT, and VT events are ignored when the program is not in OPEN mode. ST events can also be used to start primary sequences by entering a single digit or letter. In TRACK mode, TM, SM, AC, and DC events are only recognized in track 1. Each event type is described in detail below.

Note-On and Note-Off

ON events are the most common events used in the KCS. The meaning of the data in each field is exactly as described in the explanation of the fields, on page 34.

When recording note-on and note-off messages, if any note has a duration of more than 999 clock steps, the **DUR** value for that ON event becomes 0, and the program records a separate OFF event. OFF events are also used whenever note-off velocity is being recorded. OFF events use the data fields in the same way as ON events, except that the **DUR** field is not used.

The program maintains 64 duration counters, which are used to keep track of the durations for up to 64 ON events. When this limit is exceeded during playback, the program will cut short the note that would normally end next, and play the new note. This should not be a problem in most applications. One other important point to be aware of when programming durations is that when note-on and note-off messages are programmed to occur on the same time step, the note-off messages are sent after the note-on messages. (This is done to keep the note-on timing, which is more critical than note-off timing, nice and crisp.) This means that if you want to create legato parts without overlapping (slurred) notes, the durations used should be one less than the corresponding **TIME** values.

Program Change

PG events will make the instrument on the specified MIDI channel change programs. For most synthesizers, you should make sure the instrument is not currently playing a note when it is to change sounds. Some instruments may quietly shut off the note and make the change, while other instruments will make a very undesirable popping sound when changing. When entering a program change, the value under **NOTE** represents the program number. Not all instruments begin program numbering with 0. See Chapters 9 and 11 and your synthesizer's owner's manual, for specifics on your instruments.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	PG	0		
1-	1:	1	2	0	16	PG	5		

Control Change

CC events are control change events. They are generated by a mod wheel, pedal, joystick, sustain pedal, etc. The value under **NOTE** will represent the controller being changed. The numbers used to represent each controller have been pretty much standardized by the MIDI Manufacturer's Association, and are listed in Chapter 11. The value under **VEL** will be the new value for a control parameter. The range is 0--127, but only certain values may be valid for a particular instrument and type of CC event. CC events do not use the **DUR** column. The following table shows part of a sequence in which the mod wheel was moved seven steps after a note was played.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	C 4	64	120
1-	1:	8	2	7	1	CC	1	2	
1-	1:	8	3	0	1	CC	1	4	
1-	1:	9	4	1	1	CC	1	6	
1-	1:	10	5	1	1	CC	1	8	
1-	1:	10	6	0	1	CC	1	10	

CC events can be recorded in real-time, or entered one at a time from the edit screen. You will probably find it too time consuming to enter or edit control changes from a continuous controller (mod wheel, pedal, breath controller, etc.) one event at a time. You may find it useful to enter sudden changes from the Edit screen, or to create a sequence of controller events and call it up at different points in the piece using sequence start events in OPEN mode. The **Transform** menu contains an option specifically designed for editing large amounts of controller data.

Aftertouch

AT events have values from 0--127 in the **NOTE** field, and do not use the **VEL** or **DUR** fields. Since AT events use up lots of memory when recorded in real-time, you should set the sequencer to not record aftertouch unless it is specifically required.

KCS40.PRG does not support polyphonic aftertouch, though Level II does. This is described in the Level II supplemental manual.

Pitch Bend

The value entered under **NOTE** for PB events can be in the range of -8192 to 8191. The MIDI spec allows 14 bits for pitch bend, hence the large numbers. Not all synths interpret these values similarly, so experiment and check your manual. PB events do not use the **VEL** or **DUR** columns.

Single Byte Events

A single byte event may be sent over MIDI by entering a * under event **TYP** and the byte value (0--255) under **NOTE**. This allows sending any system common or system exclusive information from your sequences. When sending a single byte command from the KCS, specify the command in decimal. Some instrument manuals may show commands in hex. In the following example, the single byte events would send a MIDI song select command for song 11.

Single Byte Events (continued)

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		*	243		
1-	1:	1	2	0		*	11		

System exclusive messages can be sent by entering a single byte event for each byte in the message. This is obviously impractical for long sysex messages such as program dumps, but works well for shorter messages. **Note--it is YOUR responsibility to understand how each instrument will respond to system exclusive data. Please do not call Dr. T's Music Software with questions regarding your instruments' response to system exclusive data.**

Version 4.0 of the KCS has the ability to record short system exclusive messages as single byte events. See Chapters 9 and 11 for details.

Sequence Control Events

There are eight types of sequence control events that can control the playing of other sequences. These are primary events (which start primary sequences), ST events (which start secondary or primary sequences), XX events (which stop a sequence), XL events (which stop a sequence from looping), MS events (which mute a sequence), US events (which unmute a previously muted sequence), PT events (pitch transposition) and VT (velocity transposition). These event types can be created only from the Edit screen, and are ignored if the program is in TRACK mode.

The next few sections of this chapter describe how each of the sequence control events work. For more information on control sequence techniques, see Chapter 12.

Primary Events

Primary events are used to start any primary sequence (1--9, A--Z). When a primary sequence event is encountered, the sequence whose key is specified will be started automatically. The value under **NOTE** will be a pitch transposition in half steps, while the number under **VEL** represents a velocity transposition. The permissible range for each is -64 to 63. If a note is transposed out of the MIDI keyboard range, it will be transposed to the end of its range. If a channel has been designated as a drum channel (see page 141), that channel will not be affected by any pitch transpositions.

The following sequence will start sequences A, 2, and F as soon as it is started. A will be transposed up two half steps, and 2 will be transposed down four half steps.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		A	2	0	1
1-	1:	1	2	0		2	-4	0	1
1-	1:	1	3	0		F	0	0	1

The value under **DUR** is the number of times the sequence will repeat. It overrides the originally programmed repeat value for the sequence. If the value under **DUR** is 99, the sequence will repeat until stopped by the user or by an XX or XL event. A W in the **DUR** column represents a Wait flag. This causes the control sequence to wait until the sequence started by the sequence start event has finished before any new events can begin. In the next example, the program will start sequence A and play it four times. No other events in the sequence will be played until sequence A completes its four repetitions. When sequence B is started, the control sequence will wait again.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		A	0	0	4W
2-	1:	1	2	960		E	-2	8	1
5-	1:	1	3	2880		A	7	12	2
5-	1:	1	4	0		B	0	0	2W

ST Events

ST events are another form of sequence start event. Secondary sequences can only be started using ST events, or from the numeric keypad. To type in an ST event, put the desired event time under the **TIME** column, put ST under **TYP**, and put the desired sequence (primary or secondary) under **NOTE**. If you would like to specify a pitch transposition, enter it in the **VEL** field. Specify the number of repeats under **DUR**. You cannot specify a velocity transposition with an ST event.

Note that secondary sequences can start other sequences (including primary sequences) with sequence start events. In this example, sequences 01, 23 and A are started a measure apart. Sequence 23 will play twice, transposed up eight half steps. Sequence A will play four times, and the control sequence will wait for sequence A to finish before proceeding.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		ST	01	0	1
2-	1:	1	2	960		ST	23	8	2
3-	1:	1	3	960		ST	A	0	4W

XX and XL Events

XX events are sequence stop events. They allow you to automatically stop one or more sequences, even in the middle of playing. To stop a single sequence with an XX event, enter XX under **TYP**, and the desired sequence, left justified, under **NOTE**, as shown below.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
3-	1:	1	1	1920		XX	23		
7-	1:	1	2	3840		XX	A		
9-	1:	1	3	1920		XX	01		

More than one sequence may be stopped with a single XX event by placing an asterisk (*) under **NOTE**. An asterisk by itself will stop all sequences that are currently playing (active), or an asterisk followed by a channel number will stop all active sequences that start with an event on that channel. The following example would immediately stop all sequences on channel 1, then stop the remaining sequences one measure later:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		XX	*1		
2-	1:	1	2	960		XX	*		

Note that sequence control events that use the * option take longer to execute than similar events affecting only one sequence, and may result in audible delays if overused.

XL events are much like XX events, except that the sequences specified in the **NOTE** field will continue to play to their ends before stopping.

MS and US Events

MS and US events are much like XX and XL events, except that the specified sequences will be muted rather than stopped. The main difference is that when a sequence is muted, it will continue to play, but the events in the muted sequence will not be executed. This is useful if, for instance, you are creating a piece by stringing together complex control sequences, and would like to remove a portion of a sequence from one occurrence of a particular section, without actually editing the affected sequences. Inserting an MS event in the master control sequence, followed by a US event at the appropriate time, will "blank out" the designated sequence in that portion of the composition.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		ST	01	0	1
2-	1:	1	2	960		MS	01		
3-	1:	1	3	960		US	01		

As with the XX and XL events, multiple sequences may be specified in MS and US events using a * in the **NOTE** column.

PT and VT Events

PT and VT events cause a pitch or velocity transposition to occur in the specified sequences. The sequence number, or an asterisk and an optional channel number, are entered in the **NOTE** column, and the transposition amount, from -64 to +63, is entered under **VEL**. If the **DUR** column is blank, the value under **VEL** is added to the current transposition value for that sequence, or if an S is placed in the **DUR** column, the program will set the transposition to that value. Notes played on a channel that has been designated as a drum channel are not affected by PT events. The pitch and velocity transpositions for each sequence are set to 0 when the sequencer is started, and transpositions will be "chased" when starting from a cue point.

In the following example, secondary sequence 01 is transposed up an octave from its current transposition, and four measures later, all active sequences that start with events on channel 3 will be set to a velocity transposition of 0.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		PT	01	12	
5-	1:	1	2	3840		VT	*3	0	S

When a PT or VT event is encountered in a sequence while playing from the OPEN mode Play screen, the first four letters of the sequence's name will be replaced on the screen by the sequence's pitch transposition, and the last four letters by the sequence's velocity transposition.

TM Events

TM events in a sequence will immediately force the internal clock to change the tempo to the specified value. When a TM event is encountered the tempo will change to that value until another TM event is encountered. In OPEN mode, a sequence may have more than one TM event, or many sequences may contain TM events. In TRACK mode, only TM events on track 1 are recognized.

TM events have no effect on the tempo if the program is using MIDI clock as its clock source, though they are used for calculations when synchronizing to an external clock. See the section on timing resolution in Chapter 12 for details.

Enter TM under **TYP**, the desired tempo (in beats per minute) in the **NOTE** field, and the tenths portion of the tempo under **VEL**.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		A	0	0	4
2-	1:	1	2	960		E	0	0	1
5-	1:	1	3	2880		TM	140	2	
5-	1:	1	4	0		B	0	0	2W

In this example sequence A is played four times, one measure later sequence E plays one time, and three measures later the tempo is set to 140.2 BPM as sequence B starts playing. You should put a TM event as the first event in your control sequence to assure that it always plays at the correct tempo.

To maintain optimum accuracy when using the play timer or synchronizing to an external MIDI clock, you should place all TM events on multiples of six clock steps. This is because MIDI song pointer messages (which are used in conjunction with tempo settings and a SMPTE or equivalent synchronizer to communicate the time of day between the KCS and external devices) are quantized in units of six MIDI clocks.

AC and DC Events

AC and DC events are used to create proportional changes in tempo, as opposed to the absolute changes created by TM events. Entering a number between 1 and 3000 under **NOTE** will cause the tempo to change by that number of parts in 1024. For example, if an AC event has a value of 1024, the tempo will double, or if the number under **NOTE** were 512, the tempo would increase by 50%. AC events cause an increase in tempo, while DC events cause a decrease in tempo. AC and DC events can only be entered from the Edit screen. In TRACK mode, only AC and DC events on track 1 are recognized.

Gradual tempo changes can be made by creating a string of evenly spaced AC or DC events, and playing them along with a sequence or track either by merging them into the sequence or track, or by playing them simultaneously from a separate sequence or track. The following example would cause the tempo to increase by 10% over the space of one measure.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		AC	13		
1-	1:	13	2	120		AC	13		
1-	2:	1	3	120		AC	13		
1-	2:	13	4	120		AC	13		
1-	3:	1	5	120		AC	13		
1-	3:	13	6	120		AC	13		
1-	4:	1	7	120		AC	13		
1-	4:	13	7	120		AC	13		
2-	1:	1	9	120		DE			

Generally speaking, the best way to add AC or DC events to a sequence is to first add one or two by hand to determine the correct values and spacing to use, then using the **Paste** edit option to merge multiple copies of these events with the sequence or track. As with TM events, AC and DC events should be placed on multiples of six clock steps for best results when using the play timer. You should also remember to start any pieces that contain AC or DC events with a TM event. Otherwise, you will need to reset the tempo each time you play the piece.

DE Events

DE events are "deleted" events, in which nothing occurs. DE events are most often used at the end of a sequence to instruct the computer to wait a specified number of steps before looping or going on to play the next sequence. When using DE events in this way, they should occur at the beginning of the measure following the end of the track or sequence--*not on the last beat of the measure!* For example, in a four measure sequence or track, the "trailing DE event" should fall on step 1 of beat 1 of measure 5.

In the following example sequence A starts (and repeats four times), and four measures later (3840 clock counts) the sequence shown ends. If another control sequence is waiting for this one, that sequence will now continue playing.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		A	0	0	4
5-	1:	1	2	3840		DE			

DE events may also be used to erase or silence a wrong note without affecting the numbering of subsequent events, by typing DE over the event type of the undesired note. Clicking anywhere on the event line and pressing the <Delete> key followed by <Return> will have the same effect.

SM Events

SM events are used to change the sequencer's steps/measure setting during playback. This will have no effect at all on the music being played, but it will change the operation of the measure/beat/step counter. Use SM events anywhere that the music changes time signatures, and the new time signature will be used by the measure/beat/step counter during playback. The number of steps/measure is entered under **NOTE**, and the remaining fields are unused. In TRACK mode, SM events must be placed in track 1.

See Chapter 9 for more information on the steps/measure setting, as well as a table of common time signatures and their corresponding steps/measure values.

RA Events

RA events are used to select one of a number of events at random. The "hat" out of which an event is drawn is a list of events immediately following the RA event, and the length of this list is set by the number in the **NOTE** column. The limits for the length of the list are 2--255. After the selected event is executed, the sequence or track will continue from the next event after the end of the list.

Here are two examples that illustrate the use of the RA event. The first will play one of the five notes in the list, then continue from the G4. Note that since the D4 occurs twice in the list, it is twice as likely to be selected as any of the others.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		RA	5		
1-	1:	1	2	0	1	ON	D 4	77	50
1-	1:	1	3	0	1	ON	A 4	77	50
1-	1:	1	4	0	1	ON	F# 4	77	50
1-	1:	1	5	0	1	ON	D 3	77	50
1-	1:	1	6	0	1	ON	D 4	77	50
1-	1:	7	7	60	1	ON	G 4	84	50
1-	1:	13	8	60	1	ON	A 4	76	40

The next example shows how an RA event is used to change the structure of a piece of music, by selecting from a list of sequence control events. The sequences in the list could each be a set of tom rolls, for instance, which would inject an illusion of spontaneity into a drum part.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		RA	4		
1-	1:	1	2	0		ST	01	0	1
1-	1:	1	3	0		ST	11	0	1
1-	1:	1	4	0		ST	03	0	1
1-	1:	1	5	0		ST	05	0	1
2-	1:	1	6	960		ST	23	0	1
3-	1:	1	7	960		ST	A	0	4W

The **TIME** values for the list of possible events are ignored when playing, though they should all be set to 0 to avoid confusion when editing tracks or sequences, and especially to avoid conflicts when merging tracks or sequences. Also note that while the RA event is recognized in both modes, the list of candidate events should only contain events that are appropriate for that mode.

CU Events

CU events cause the sequence or track that contains them to wait until a specified time (the "cue time") on the play timer. The **NOTE, DUR,** and **VEL** columns hold the minutes, seconds, and tenths of seconds values for the cue point. Minutes can be any value from 0 to 255, and seconds, of course, must be less than 60. CU events are ignored if the **Min:sec** switch, on the Environment screen, is turned off.

Care should be exercised when using CU events. If the time specified has already passed when the event occurs, the program will think that it is late, and will spew out notes and MIDI clocks at maximum speed, in an attempt to catch up with itself. This can happen if a sequence containing a CU event is looped, or if tracks containing CU events are appended or doubled.

See the section on **Timing Resolution**, in Chapter 12, for more information on the play timer.

Editing Operations and the Menu Bar

The sequencer's editing operations are located in two different areas of the KCS Edit screens. The most commonly used functions are displayed on the right half of the screen, while the less frequently used options are located in the **Options** and **Transform** menus at the top of the screen. An option in the right half of the screen is selected by clicking on the box beside its name, and items in the pull down menu are selected in the usual way. Depending on the option chosen, a message and/or edit window may appear. The specific details on each option are explained later in this chapter.

Editing Operations and the Menu Bar (continued)

The **File** menu at the top of the screen contains options for transferring data to the disk drive and for exiting the program, and is described in detail in Chapter 8. The **Edit** menu duplicates the **Cut**, **Copy**, and **Paste** options in the right half of the screen. The **Transform** menu contains several options for performing editing operations on ranges of events, and is described later in this chapter. The **Environment** menu contains a number of items relating to the overall KCS recording environment, and is discussed in Chapter 9. The menus will drop down when the mouse passes over them, just as they do in other programs, unless the **Pull Down** switch on the Environment screen is set; in that case, you must click the left button to bring down the menu.

While most of the options on the Edit screen are identical in both TRACK and OPEN modes, there are slight differences in some cases, and some options appear only in one mode or the other. If this is the case, it will be noted in the section on that option.

The Edit Options

The right side of the screen, called the *edit options* area, contains most of the editing functions that you will want instant access to.

Name
Comments
The name of a track or sequence consists of eight characters. When you start to record on an unnamed track or sequence, the program will name the track or sequence with the MIDI channel number. The event type will be part of the name if the first event is not a note. If you click on the box beside **Name**, the edit cursor will move to the top of the screen where the name is displayed. Type in the new name, and press <Return>.

In OPEN mode, a thirty character comment field, directly below the **Events left** line, can also be accessed by clicking on or to the right of the **Comm:** label.

Insert
Adjust
These options are used to insert new data in a sequence or track at the current position of the edit cursor. Clicking on either will create a new blank line ahead of the current event, at which point new events can be typed in as described earlier in this chapter.

When **Insert** is selected, events are simply inserted in the sequence or track, with no adjustments to timing. When **Adjust** is chosen, the program will attempt to keep the length of the sequence constant, by subtracting from the **TIME** value of the first event after the insert point. If the **TIME** value for this event becomes 0, the program will no longer be able to adjust, and the length of the sequence or track will increase as more events are entered.

You can also insert new material by pressing the <Alternate> key. In this case, the program will use the most recently chosen of the **Insert** or **Adjust** options.

When you have finished inserting, use the cursor keys to move to a new event line or click the left mouse button.

Backup
Get Backup
Undo
Clicking on **Backup** will make a copy of your current sequence or track. The message "Backup accomplished" will appear on the message line, or an error message will appear if there is no room for the copy. It is a good idea to make a backup before making any change that can not easily be reversed.

The **Get Backup** command exchanges your current sequence or track data with the most recently made backup. This allows you to swap and compare the sequences.

A separate backup sequence is created whenever a **Transform**, **Cut**, **Paste**, **Delete**, **Erase**, or **Split** operation occurs. Clicking on **Undo** or pressing the <Undo> key will swap this sequence with the altered original track or sequence.

The manual and automatic backups are stored by the program in sequences Y and Z, respectively. You can therefore hear either backup sequence from the OPEN mode Play screen by pressing the appropriate key. If you decide that you want to keep both your edited material and the backup, copy the edited sequence or track to a new location and retrieve the original data by clicking on **Get Backup** or **Undo.**

If you are planning extensive changes to a sequence or track, you may wish to make a copy of your original using one of the copy commands described below before you start editing, and then make frequent backups as you edit.

Delete
Erase
Delete and **Erase** are used to remove a range of events from a sequence or track. **Delete** will shorten the length of the sequence or track, while **Erase** preserves the length of the sequence or track by adding the time values of the events that are erased to the time of the first event after the selected range.

If a range is highlighted in the event list, it will be deleted or erased after choosing one of these options. If no range is highlighted, a dialog box will prompt you for the range of events to be removed. The beginning and end of the range can be specified by typing in the event numbers for each, or they can be set to the beginning or end of the sequence or track by clicking on **START** or **END.** It is not possible to delete or erase an entire sequence or track--at least one event must remain.

Find

Find is used to locate a particular measure in a track or sequence. Entering a number after clicking on **Find** will place the edit cursor on the event nearest to the start of that measure.

Calc

The **Calc** option is a convenience for calculating the number of steps between two points. Click on **Calc**, and an edit window will prompt you for two measure/beat/step values, the first of which defaults to the current position of the edit cursor (or the beginning of the range, if one is highlighted). After entering the values and clicking on **CALCULATE**, the difference between those two points, in steps, will be shown on the message line. If the exit button labeled **CORRECT** is chosen instead of **CALCULATE**, the program will attempt to "correct" the time of the current step to that in the second measure/beat/step entry by adding the calculated time to the current time. This allows you to enter a new event location in terms of its measure and step directly in the **Calc** window, without dealing with the **TIME** setting.

If a range is highlighted when you click on **Calc**, the length of the range will be displayed immediately, and the edit window will not appear.

After **Calc** is used to compute a time value, typing a "C" in the **TIME** column will enter the calculated time value at that point.

Split
This option allows you to split the current sequence or track into two parts. You may specify a range of notes and/or a group of controllers, as well as a MIDI channel, that will be moved to the next available track or sequence. The fields labeled **Note Range**, **Channel**, **Volume**, etc. are buttons which allow you to specify what event types will be split to the new track or sequence. **bot** and **top** set the upper and lower limits of the notes that will be split. If only the **Channel** button is selected, then all events on the specified channel will be split; otherwise, only the event types specified on that channel will be split.

PVG (Level II only)
Master Edit (Level II only)
These two buttons provided entry into Level II's special features: the Programmable Variations Generator and the Master Editor. Details on these modules are provided in a separate manual.

Clone Sequence
Clone Track
Each of these options makes a permanent copy of the current sequence or track. In OPEN mode, the **Clone Sequence** button brings up a dialog box asking you to select the sequence that you wish to copy to. The default will be the first unused sequence. If you copy to an existing sequence, that sequence will be lost.

Clone Track will copy the current track to the first unused track. Remember that both this track and the current track will play unless you mute one of them. The **Mute** and **Set Mute Switch** track functions described on pages 88 and 97 allow you to easily compare the original and edited track within the context that they are to be used.

Tracks and sequences can also be copied with the **Seq to Track...** and **Track to Seq...** items in the **Options** menus.

Seq to All Tracks
All Tracks to Seq
These options, which are found in TRACK mode only, allow you to move data back and forth between the 48 track tape recorder environment of TRACK mode and individual OPEN mode sequences. These sequences can be chained or otherwise combined into longer pieces by using control sequences.

Seq to All Tracks copies an OPEN mode sequence into TRACK mode. The **Clear Tracks First** button is used to protect the existing contents of TRACK mode. If this button is highlighted, the existing tracks are erased; otherwise, the sequence is placed in tracks that are empty. Events in the sequence copied will be sorted by MIDI channel, with each channel assigned to a different track, and with tempos, SM and CU events placed on track 1.

Seq to All Tracks... is handy for unmerging OPEN mode sequences, for editing channels independently, and for splitting up sequences recorded from another sequencer. Each track will be named with the channel and output port of the data that it contains.

If a sequence contains sequence start events (either Primary or ST events), then the contents of those sequences will also be copied to TRACK mode when **Seq to All Tracks...** is executed. You should note, however, that there are some limitations here: wait times in the sequence start events are ignored, and only one level of sequences will actually be copied--that is, things will not work properly if the sequence start events start other control sequences.

All Tracks to Seq will merge the data from all active tracks (tracks that are not muted) into one or more OPEN mode sequences. The length of the merged sequence will be determined by the length of track 1.

When **All Tracks to Seq** is chosen, an edit window will appear after the sequence selection dialog box, in which you can enter a name and comments for the sequence. The comments for the sequence will default to a list of the unmuted tracks, or the list can be cleared by clicking on the field and pressing <Shift-Del>. The edit window also has a button labeled **Include Muted Tracks.** If **Include Muted Tracks** is turned on, all tracks will be copied to the new sequence, regardless of their status. **All Tracks to Seq...** can also be selected directly from the TRACK mode Play screen through the **Options** menu.

If your tracks utilize multiple output ports, the edit window will ask for several sequences, instead of just one. The first is a control sequence, and the remainder are sequences which will contain the sequence data for each port. The control sequence will consist of a list of ST events which start the other sequences. If you wish, the ST events can be placed in one of the output port sequences by setting the two sequence numbers to the same value.

By using **All Tracks to Seq** followed immediately by **Seq to All Tracks,** it's possible to clean up your tracks, putting events on each channel on individual tracks. This is especially handy if you've recorded multiple channels on a single track. However, you should be aware that *all* events on the same channel will end up on the same track, which can be a big negative if you use a separate track for each drum. In this case, you may want to copy these tracks to OPEN mode separately (using the **Track to Seq...** option), and then bring them back to TRACK mode one at a time.

Append

This option allows you to append another sequence to the current sequence or track. A copy of the appended sequence is simply tacked onto the end of the sequence being edited.

Delete Sequence
Delete Track
These options allow you to delete an unwanted track or sequence. A dialog box will request the sequence or track number, which defaults to the current track or sequence. Sequences Y and Z, and track 1, cannot be deleted.

Clear All Tracks
This menu item erases all tracks in memory. It does not erase anything from OPEN mode. An edit window will allow you to set the length of all tracks, in measures. If you do so, the program will create track 1 with a single DE event whose **TIME** is the desired length. This will determine the effective length of any additional tracks that you record. If you change your mind, you can also cancel the operation from this window. After the clear operation, the program will put you on the TRACK mode Play/Record screen.

Play Screen
This option takes you to the Play screen of the mode that you are currently in. The TRACK and OPEN mode Play screens are described in detail in Chapters 5 and 6. The TRACK mode Play screen automatically puts you in record. To record in OPEN mode, you have to select the record option described below.

You may also use the right mouse button to play music without leaving the edit screen, as described in the section on **Playing from the Edit Screen**, on page 39.

Record
This is used to enter the record screen from OPEN mode only. OPEN mode recording is described in detail in Chapter 6.

TRACK Play
TRACK Edit
OPEN mode
These options are used to move between the program's two operating modes. When you enter OPEN mode, the program will place you on the Edit screen. TRACK mode can be entered through either the Play/Record or Edit screens.

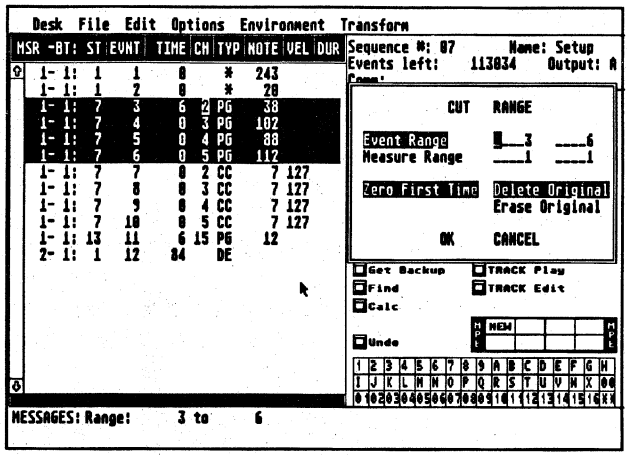
MPE
The eight boxes labeled **MPE** are used to access programs through the Multi Program Environment. The MPE is described in detail in Chapter 10.

Cut and Paste Editing

The **Cut**, **Copy**, and **Paste** options are among the most powerful in the KCS. These commands utilize what we call the *paste buffer*. You can use the paste buffer to move and copy part or all of a sequence or track to another sequence or track. The same paste buffer is used for OPEN and TRACK modes, so you can use this to move information between the two modes. Any time you cut or copy, the existing contents of the paste buffer are discarded.

Cut, **Copy**, and **Paste** may all be selected either from the edit options area, or from the **Edit** menu.

Cut
The **Cut** command will delete or erase the events in a desired range and place the events in the paste buffer. After you select this option, the edit window shown on the next page will appear.



The Cut Edit Window

The **Cut** edit window allows you to set a range by event or by measure. Cutting all the events in a sequence or track is not allowed. Click on **Event Range** or **Measure Range** to set the range; the values to the right of these buttons contain the start and stop points for the cut.

Delete Original and **Erase Original** affect the data that is left in the original sequence or track. **Delete Original** will remove the specified section and shorten the sequence or track. **Erase Original** removes the events specified but adds their time values to the next event after the selected range, thus preserving the original timing.

Zero First Time forces the **TIME** value of the first event to zero; this is usually the most convenient value when pasting. Click on **OK**, and the data will be moved to the paste buffer. This data will remain in the paste buffer until you next use the **Cut** or **Copy** command.

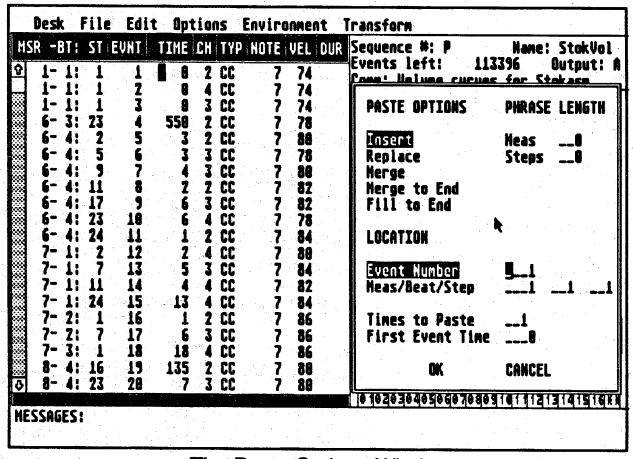
Copy

The **Copy** command is identical to the **Cut** command, except that the selected range is not deleted or erased from the sequence or track. It is also possible to copy all of a sequence or track.

Paste

Once you have moved data into the paste buffer using the **Cut** or **Copy** command, you can use the **Paste** command. There are a number of different ways to paste material to a track or sequence, which are outlined below.

After you select **Paste**, the edit window shown below will appear. This lets you select the type of paste operation that will be performed, and specify how many times the data will be pasted.



The Paste Options Window

PASTE OPTIONS

Insert will place the contents of the paste buffer at the specified location, without changing the existing data at the paste location. **Insert** is like cutting a piece of tape, and splicing in one or more copies of the paste buffer. The rest of the sequence will be pushed back in time, and the sequence will become longer.

Replace will take the contents of the paste buffer and put it at the specified location. The previous contents of the sequence will be written over for the length of the phrase. **Replace** is like erasing a section of tape and replacing it with the contents of the paste buffer. The timing of events after the end of the paste will not be altered.

Merge will mix the contents of the paste buffer with the sequence. Both parts will play with their original timing. The result will be the same as if both the sequence and paste buffer were played together.

Merge to End is similar to **Merge**, except that copies of the paste buffer are mixed into the sequence, one after the other, until the end of the sequence is reached. A simple application would be to have the paste buffer consist of one note, say a bass drum hit on a drum machine. Setting the phrase length to 960 steps (one measure at 240 steps/beat) and performing a **Merge to End** would cause one bass drum hit to be added every measure of the sequence.

Fill to End is like **Replace**, except that all data is erased from the sequence after the paste location. This data is replaced with enough copies of the paste buffer to make the resulting sequence the same length as the original.

After an **Insert** or **Replace** paste operation is executed, the pasted range will be highlighted in the event list. This allows you to see that the paste was done properly.

PHRASE LENGTH
The length of the phrase which is pasted to the new location can also be changed by entering a phrase length, in measures and steps, under **PHRASE LENGTH.** These features can be particularly useful when doing multiple pastes. Note that the program will not allow you to increase the time or decrease the phrase length in a way which affects the relative timing of the events being pasted.

LOCATION
There are two different ways to select a paste location: either by event number, or by specifying a measure and step. If you specify **Event Number**, the paste occurs immediately before the event specified to the right of the button. If you want to paste at the beginning of the sequence, enter 1.

Meas/Beat/Step is used primarily when you want to paste at a point in the sequence which is not a location of an event in the sequence. The program will do the paste before any events at the selected measure and step. Remember, the sequence or track begins at measure 1, beat 1, step 1, and the first step of any new beat is step 1 of that beat, NOT step 0.

The values for **Event Number** and **Meas/Beat/Step** will default to the current location of the edit cursor.

Times to Paste
First Event Time
You can also select the number of times you wish to paste. The program will paste copies of the paste buffer, one after the other, for the number of times selected. **Times to Paste** is used for the first three paste options only; it is ignored if you select **Fill to End** or **Merge to End.**

First Event Time sets the time of the first event in the paste, same as in the **Cut** and **Copy** edit windows.

When you use **Paste** in TRACK mode, remember that all tracks will loop when track 1 finishes playing. Notes that are pasted onto a track at a measure and step that is past the end of track 1 will not sound when all tracks are played at once, and extending track 1 will cause a gap in the other tracks when the sequencer loops.

The Options Menu

The **Options** menu contains several functions that are similar to those found in the edit options area, yet which you won't be needing as often.

Set Cue Points...
This option provides an alternate way to view and edit TRACK mode's six cue loops. The edit window that appears contains a list of the six cue loops, as well as their start and stop points. If you enter a start or end point that is beyond the end of track 1, it will be resolved to the end of track 1 when the track is played.

Track to Seq...
Seq to Track...
These items copy an OPEN mode sequence into the first unused track in TRACK mode, or vice versa. Note that neither these options nor the **Append** or **Merge...** options described elsewhere in this chapter will have any effect on the sequence being copied, merged or appended.

Append Seq to Track...
This option allows you to append an OPEN mode sequence to the current track. A copy of the appended sequence is simply tacked onto the end of the track being edited.

Change Repeats...
This option, which only appears in OPEN mode, sets the number of times a sequence will play when started from the OPEN mode Play/Record screen. A dialog box will ask you to specify a number from 1 to 99. Enter 99 if you want the sequence to repeat indefinitely. When a sequence is started from a control sequence, it will play the number of times that are specified by that control sequence.

Merge...
Available in OPEN mode only, this option merges a second sequence with the sequence being edited. The sequence will now sound as though both sequences were playing at once. In TRACK mode, this task is accomplished using the **Track Merge...** item in the Play/Record screen **Options** menu, described on page 94.

Step Time Append
Step Time Track...
Step Time Append is used to enter notes at the end of the current sequence or track with the step-time recording feature of the KCS. See Chapter 7 (**Step-time Recording**) for more information. If you are in TRACK mode, you should remember that the effective length of all tracks is the length of track 1. Appending to track 1 thus increases the effective length. Appends that make another track longer than track 1 will not be heard when all tracks are played together.

Step Time Track... allows you to create a new track in step-time. A dialog box will ask the measure at which you wish to start recording, and the program will set the time of the first event recorded so that it is at the selected measure. This feature allows you to add new material at any point in a set of tracks.

Pressing <F1> or left clicking on **EXIT** when in step-time record will return you to the Edit screen.

Double
The **Double** item in the TRACK mode edit **Options** menu simply doubles the length of all tracks. If any tracks contain data beyond the end of track 1, it will be lost. Since the length of track 1 sets the loop point for all 48 tracks, you could extend a set of tracks by half their length (for example) by first using the **Double** option, and then shortening track 1 by the required amount.

Text...
This item provides access to a 16 line by 68 character text area, which can be used to hold comments about a piece. The text area is saved and loaded with .ALL files.

The mouse and the <Backspace> and cursor control keys can be used to move the cursor around the text area, and the <Clr/Home> key will erase the entire line which holds the cursor. Note that .ALL files saved by versions of the program before 1.5 will display gibberish in the text area when loaded. This is normal, and can be written over with no danger of damaging your data.

Map...
The **Map...** option displays a map of all tracks and sequences in memory, including their names, comments, output ports, and lengths in measures and events, as well as the channel number and event type of the first event in each track and sequence. The map and text area may be listed to a printer by pressing <P> after the map is displayed on the screen. The <Control> key will terminate printing when sending the map to a printer. If <Shift> is held down when **Map...** is selected, the map will be sent directly to the printer, in addition to being displayed on the screen.

Print...
Print... sends a copy of the current sequence or track to the printer. The range is set as described on page 58 for **Delete** and **Erase**. If there is no printer connected or if the printer doesn't respond, a dialog box will ask if you want to abort or try again.

Output Port...
This option is used to specify the output port to be used by the sequence or track.

Output ports are specified by the letters A through D. The maximum value for this is set by the **MIDI Outputs** parameter on the Environment screen. If your ST does not have some sort of MIDI expansion box connected to the serial (modem) port, only output A is available. Each track or sequence can only be directed to a single output.

For more on the use of multiple outputs, see page 183.

The Transform Menu

The **Transform** menu contains a variety of options for performing bulk editing operations on either an entire sequence or track, or a range of events.

After you select any item from the **Transform** menu (except **Clear Deletes**), an edit window will appear where you may specify the range of events to be transformed. The range of events to be edited is selected by clicking on **All**, **Event Range**, or **Measure Range**. If either of the last two options is chosen, the numbers to the right of these buttons set the upper and lower limits of the range. If a range is highlighted when you select a menu item, the range end points will appear in the **Event Range** fields.

Clicking on **Undo** or pressing the <Undo> key after a **Transform** operation will return the track or sequence to its previous state.

Erase Controllers...
This item is used to erase all non-note events in the sequence or track, including controllers, sequence control events, single byte messages, and tempo events. An edit window will allow you to specify the range used.

Clear Deletes
This item is a convenience feature which erases all DE events from a sequence or track, except for the final "trailing" DE, if any. This option always affects the entire sequence or track.

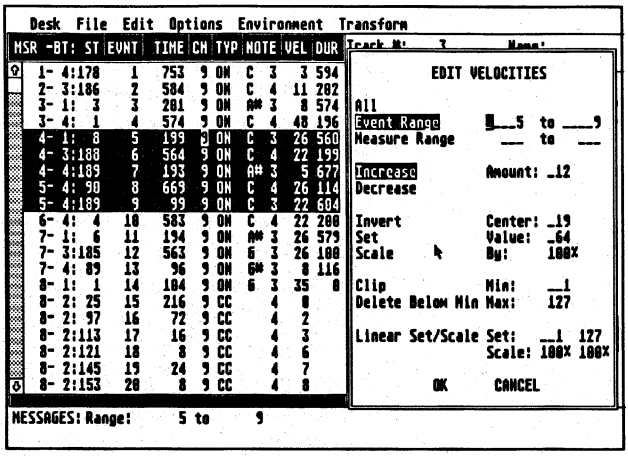
Pitches...

This item lets you transform the pitches of all note-on and note-off events in the specified range. **Transpose Up** and **Transpose Down** will shift the pitches up or down by the amount specified in the field to the right of these buttons. Transposing pitch by -12 drops all notes down one octave, and a pitch transposition of 7 would raise the pitch up seven half steps (a fifth). If you attempt to transpose out of range, the resulting pitches will be the proper "pitch class" (C, C#, etc.), but will be transposed up or down by octaves so that they fall within the range of MIDI. **Set** sets all pitches to the same value, and **Invert** inverts the selected pitches, using the specified pitch as the center of the inversion. **Invert** causes high pitches to become low, and low pitches to become high. Inverting the default C major scale that appears in sequence 1 around middle C (C4) will produce a descending scale that goes from C4 down to C3. Be careful, though, since inversions will usually cause the part to change keys, except for certain inversion points. In the example of the C Major scale, inverting around C4 changes the scale to a C Phrygian scale, while inverting around D4 gives an E Major scale, etc.

Velocities...

This item lets you process the velocities of any note-on events in the specified range. (Note-off velocities are unaffected.) After you select **Velocities...**, the edit window shown on the following page will appear. The buttons along the left side of the window are editing operations that will be executed after you click on **OK**, or if you <Shift> click on the desired option.

The Transform Menu (continued)



Velocity Transform Window

Increase and **Decrease** shift the velocities up or down by the specified amount. **Invert** and **Set** invert the velocities about the specified center point, or set all velocities to the specified value. **Scale** is used to multiply all velocities in the range by the specified percentage. A value of 50% sets all velocities to half their original values, etc.

Clip is used to limit velocities to fall within the specified range. If any notes have velocities above the maximum value, they will be set to the maximum, and notes below the minimum are set to the minimum value. If **Delete Below Min** is selected, any notes with velocities below the minimum clip value will be replaced with DE events.

The **Linear Set/Scale** operation is rather complex. In a nutshell, it's a combination set and scaling function. The two **Set** values define a linear velocity ramp which is used to set the velocities, and the two **Scale** values define a scaling ramp, which determines what proportion of the original velocities will be used. For instance, if **Scale** is 100% at one end of the range, then the velocities determined by the **Set** values will be used at that end; if **Scale** is 0% at one end, then the original velocities will be used at that end; and if **Scale** is 50%, then the resultant velocities will be an average of the two.

In practice, the two most common ways to use **Linear Set/Scale** will be to either set both **Set** values to the same number, and use different **Scale** settings, or to use different **Set** values, and use identical **Scale** values. In the first case, the varying fit percentage creates a gradual "shading" between the original velocities and the single **Set** value over the course of the range, and in the second, the fixed **Scale** results in a weighted average between the original velocities and the linear ramp formed by the two different **Set** values. Of course, it's also possible to set all four parameters to different values, but in this case, the results are so complex they defy our powers of explanation.

The following event lists show how a simple sequence containing five notes would be transformed by a variety of **Linear Set/Scale** settings. The first is the original sequence.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	C 4	12	120
1-	2:	1	2	240	1	ON	C 4	64	120
1-	3:	1	3	240	1	ON	C 4	90	120
1-	4:	1	4	240	1	ON	C 4	64	120
2-	1:	1	5	240	1	ON	C 4	12	120
2-	2:	1	6	240		DE			

If the **Set** values are 1 and 127, and both **Scale** settings are 100%:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	C 4	1	120
1-	2:	1	2	240	1	ON	C 4	26	120
1-	3:	1	3	240	1	ON	C 4	51	120
1-	4:	1	4	240	1	ON	C 4	76	120
2-	1:	1	5	240	1	ON	C 4	101	120
2-	2:	1	6	240		DE			

If the **Set** values are 1 and 127, and the **Scale** settings are 100% and 0%:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	C 4	1	120
1-	2:	1	2	240	1	ON	C 4	33	120
1-	3:	1	3	240	1	ON	C 4	66	120
1-	4:	1	4	240	1	ON	C 4	68	120
2-	1:	1	5	240	1	ON	C 4	29	120
2-	2:	1	6	240		DE			

And if both **Set** values are 127, and the **Scale** settings are 100% and 0%:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	C 4	127	120
1-	2:	1	2	240	1	ON	C 4	114	120
1-	3:	1	3	240	1	ON	C 4	112	120
1-	4:	1	4	240	1	ON	C 4	89	120
2-	1:	1	5	240	1	ON	C 4	35	120
2-	1:	2	6	240		DE			

Durations...
This item is used to process the durations, or lengths, of any note-on events in the range. The options in the corresponding edit window are identical to those in the **Velocities...** window, described on page 73. Durations cannot be transformed to values above 999, or below 1.

Controllers...
This item lets you transform all of the CC or AT events of a single type within the specified range. The type is specified by the radio buttons beneath the range selector. The **CC** option lets you specify any controller type that is not listed, by entering the appropriate number. The CC numbers for various controllers are listed on page 169. The remaining options in the **Controllers...** window are identical to those in the **Velocities...** window, and are described on page 73.

Pitch Bends...
This item is used to process all of the pitch bend data in the specified range. Again, the options in this edit window are identical to those in the **Velocities...** item. You should note that the values listed here are NOT identical to those shown in the event list; they only show the high byte of the pitch bend value. This is equivalent to the "true" pitch bend value divided by 128. It may seem that something is lost by doing this, but in practice, this is not the case, since almost all MIDI instruments (all of those we're familiar with, in any case) ignore the low byte of pitch bend messages.

Time Reverse...

The **Time Reverse** option will rearrange events so that they play in reverse order. The **TIME** values of the first and last notes are not changed, and if the last event in the range selected is a DE event, it won't be affected either. Note that since the value in the **TIME** field represents the amount of time that elapses before an event occurs, time reversal will not preserve the relationship between an event's **TIME** and **DUR** values. For example, consider the following sequence:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	C 3	50	100
1-	1:	13	2	120	1	ON	D 3	50	100
1-	2:	1	3	120	1	ON	E 3	50	100
1-	2:	13	4	120	1	ON	F 3	50	100
1-	3:	1	5	120	1	ON	G 3	50	100
1-	3:	13	6	120	1	ON	A 3	50	100
1-	4:	1	7	120	1	ON	B 3	50	100
2-	1:	1	8	240	1	ON	C 4	50	940
3-	1:	1	9	960		DE			

Reversing the order of this sequence yields:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	C 4	50	940
1-	2:	1	2	240	1	ON	B 3	50	100
1-	2:	13	3	120	1	ON	A 3	50	100
1-	3:	1	4	120	1	ON	G 3	50	100
1-	3:	13	5	120	1	ON	F 3	50	100
1-	4:	1	6	120	1	ON	E 3	50	100
1-	4:	13	7	120	1	ON	D 3	50	100
2-	1:	1	8	120	1	ON	C 3	50	100
3-	1:	1	9	960		DE			

Now the C4 with the duration of 940 sustains while the other notes are playing. In a case such as this, you might want to swap the durations of events 2 and 9, to preserve the original timing relationships.

Quantize...

Quantize... is used to round all of the **TIME** and/or **DUR** values in a track or sequence to multiples of some number. This is usually done to smooth out or "auto-correct" the timing of a less than perfect recording, but can also be used for special effects. The **Time Quantize** value sets the step count for auto-correction. After quantization, all times in the selected range will be a whole number multiple of the step count. The following table shows the step counts corresponding to several common note values at the system default clock resolution of 240 steps/beat:

30 for 32nd notes	40 for 16th note triplets
60 for 16th notes	80 for 8th note triplets
120 for 8th notes	160 for quarter note triplets
240 for quarter notes	480 for half notes
960 for whole notes	

The field labeled **Duration Quant** has a similar effect on the durations in the selected range. When duration is auto-corrected, the resulting duration values are actually one less than the nearest multiple of the duration auto-correct value. For instance, entering a value of 60 for **Duration Quant** results in duration values of 50, 110, 170, etc. instead of 60, 120, and 180. This allows notes played on monophonic instruments to retrigger when legato parts are played, by ensuring that a note-off message is sent before the next ON event in the sequence or track. You can choose to quantize only the note durations, or their start times, by leaving the corresponding field blank.

When a portion of a track or sequence containing events other than ON and OFF events is auto-corrected, the program treats all the non-note events between each pair of ON events as part of the first note, and moves them along with that note. This is handy if a sequence contains pitch bends or other controller messages that you want to tie to particular notes. If you want to auto-correct a part without affecting the non-note data, use the **Split** edit option to separate the note data to another track or sequence, as described on page 60.

Channel Assign...

This item changes the MIDI channel numbers of events in the selected range. If the **Remap Channels** button is selected, any events on the first channel listed to the right of this button will be rechannelized to the second channel. If the button labeled **Channels** is selected, then all events in the range will be rechannelized. If only the first of the two data fields to the right of this switch contains a value, all events will be assigned to this channel; if both values are present, then consecutive events will be assigned to the next higher MIDI channel within the specified range. For example, if **Channels** is selected, and the two values to the right of this button are 1 and 3, then the edited sequence will look something like this:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	1	ON	D 4	77	50
1-	1:	1	2	0	2	ON	A 4	77	50
1-	1:	1	3	0	3	ON	F# 4	77	50
1-	1:	1	4	0	1	ON	D 3	77	50
1-	1:	1	5	0	2	ON	D 4	77	50
1-	1:	7	6	60	3	ON	G 4	84	50
1-	1:	13	7	60	1	ON	A 4	76	40

This is useful for playing polyphonic parts on a synth in Mono mode, or for adding spice to an arrangement by "hocketing" the part across several different or similar instrumental sounds.

Compress/Expand...

The **Compress/Expand...** menu item changes the overall timing of the sequence or track. This option can also be used to speed up or slow down a part, relative to the other parts of your song. The field labeled **Factor** sets the amount of compression or expansion (in percent), and the **Do Durations** button causes durations to be affected as well as time. Each note's **TIME** and/or **DUR** value will be multiplied by the amount you enter, divided by 100. Entering an amount of 200 results in a sequence or track which is twice as long as the original, 50 makes the part half as long, etc.

Chapter 5

TRACK Mode Play/Record

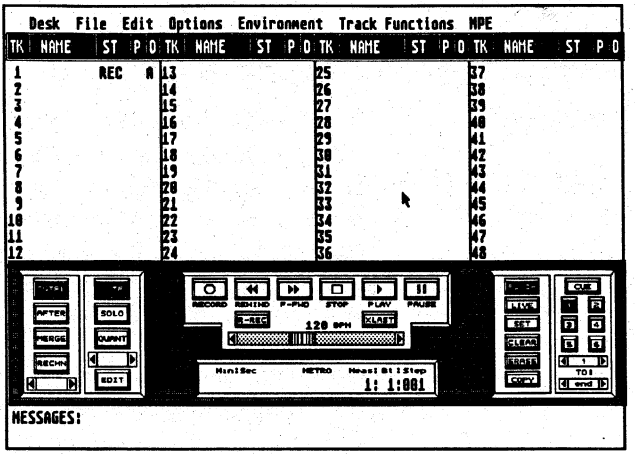
The TRACK mode Play/Record screen of the KCS functions as a 48 track tape recorder, with all the controls usually found on a mechanical tape recorder, as well as many more that have no counterparts on the physical instrument. Tracks may be recorded, muted, soloed, or time-shifted, all while the music is playing. Punch recording is possible, with separate punch-in/out points supported for each track, and up to six cue points can be set for immediate access to any part of the song. All aspects of recording and playback are controlled in real-time from the Play/Record screen.

TRACK mode can be used in many different ways in composition. Obviously, you can use it as a sort of software tape deck, and record an entire piece in a linear fashion. (Most sequencers let you do no more than that.) On the other hand, you could also use TRACK mode as a "front end" for OPEN mode sequencing, creating individual multi-track song segments in TRACK mode, and then copying these to OPEN mode and linking them in a control sequence.

Play/Record Screen

The TRACK mode Play/Record screen will appear whenever TRACK mode is entered from one of the other two modes, and when the program is first booted. The Play/Record screen is shown on the following page.

Play/Record Screen (continued)



TRACK Mode Play/Record Screen

The screen is divided into three sections, other than the menu bar: the track status area, the control panel, and the message line. The track status area, in the upper portion of the screen, displays the play status of each track. Activity on any track is also shown in the track status area by a musical note icon, which changes color as notes occur on that track. The control panel, in the lower part of the screen, contains a number of buttons and indicators which mimic the operation of a tape recorder, and the message line, at the very bottom of the screen, displays messages relating to various controls that aren't shown on the control panel. All of the buttons on the control panel can be activated with the mouse, or from the computer's keyboard. In addition, there are a number of other controls which can be accessed only from the keyboard or the Environment screen. Each control is described in detail later in this chapter.

The menu bar on the TRACK mode Play/Record screen is a little different than that on the Edit screens. In addition to the menus found on the Edit screens, the Play/Record screen contains one new menu. The **Track Functions** menu contains features that are specific to TRACK mode, as does the **Options** menu. The **MPE** menu allows you to load and run MPE programs. The **Track Functions** and **Options** menus are described in detail later in this chapter, and the MPE is described in Chapter 10.

Recording in TRACK Mode

Recording starts when a note is played on the controller connected to the computer's MIDI in, when the **PLAY** button is clicked, or when the <F10> key (or the <Space bar>) is pressed. As soon as recording starts, the visual metronome will start to flash, the audible metronome will start to beep, and the measure/beat/step counter will start counting. Recording ends when the <F10> key is pressed, or when the end of track 1 is reached, if track 1 has already been recorded. (The time at which recording stops is also affected by the **Align** option, described on page 136.) At this point, recording will start on the next available track, and continue until the end of track 1 is reached again. This process repeats until all 48 tracks are full, or until the sequencer is stopped. Recording can be turned on and off while the sequencer is running by clicking on the **RECORD** button or pressing <F2>, and all of the other controls can be changed during record or playback as well.

Track Functions

The *track functions* are used to "do something" to a track. There are seventeen different track functions, only one of which can be active at a time. Track functions are selected either from the **Track Functions** menu, from the control panel, or with the keyboard.

Track functions are executed, or applied to a track, by clicking the mouse on the appropriate track in the display. (This is called *selecting* a track.) For instance, if **Mute** is the active track function, then clicking on a track will mute that track (turn off its output), or if **Set Punch** is active, then clicking on a track lets you set its punch-in and punch-out points.

The individual track functions are described in detail later in this chapter, on page 96.

The "Transport" Controls

The control panel contains several buttons for starting and stopping the sequencer, and for selecting some of the more common track functions. The buttons in the center of the control panel make up what we might be tempted to call the "tape transport controls" if we were to push the tape deck analogy to its extreme; but we aren't, so we'll leave them unnamed. In any case, we'll examine these buttons first.

RECORD
This button is used to turn recording on and off. This button will light up when recording is activated. Recording can also be turned on or off with the <F2> key.

REWIND
This moves the sequencer's "play position" back in time. It is only active when the left mouse button is held down--that is, it is a momentary switch, unlike most others, which are toggle switches. The <Numeric -> key does the same thing.

F-FWD
This button duplicates the "fast forward" function found on tape decks. If the sequencer is playing when you press **F-FWD**, it will continue to play (at a very high tempo) while the sequencer fast-forwards. Like the **REWIND** button, **F-FWD** is a momentary switch. The <Numeric +> key will also fast-forward the sequencer.

STOP
Clicking on **STOP** will stop playback of all tracks and complete the current recording (if **RECORD** is on). If you click on **STOP** when the sequencer is stopped, its "play position" will be reset to the beginning of all tracks, or to the current cue point, if one is selected. The <Enter> key duplicates this function.

PLAY
This starts the sequencer. If recording is enabled, recording will start when **PLAY** is selected. If a cue point has been set, playback or recording will start from that point. Playback can also be started with the <F10> key, the <Space bar>, or the right mouse button.

PAUSE
Clicking on **PAUSE** or pressing the <Esc> key will temporarily stop the sequencer. Notes played on the keyboard will not be recorded when paused, though controllers may be recorded, depending on the setting of the **Controllers Pause** switch on the Environment screen. Clicking on **PAUSE** a second time will restart the sequencer.

R-REC (Re-Record)
Clicking on this button or pressing <Undo> will erase the current track. Normally, this option will stop the sequencer and set the measure/beat/step counter to the beginning of the sequence (or current cue point). The automatic stop feature can be turned off from the Environment screen by turning off the **Rerecord Stop** button. In this case, clicking on **R-REC** will erase the current track, without affecting the sequencer's playback.

X-LAST (Erase Last Track)
This button causes the most recently recorded complete track to be erased, along with the current record track. This function is duplicated by the <?> (<Shift-/>) key. Be careful when using this button, as the sequencer will not ask you to confirm this selection before erasing these tracks!

Tempo

The sequencer's tempo is displayed in beats per minute (BPM) in the middle of this area. It can be adjusted by dragging the horizontal slider just beneath the tempo display (click and hold the left mouse button to drag the mouse), by clicking on the arrows at either end of the slider, or by pressing the <,> (<Comma>) or <.> (<Period>) keys. The amount that the tempo will change by when either of the last two methods is used is set by the **Tempo Change by Ratio** switch, in the **Options** menu. The range of the tempo slider itself is set by the **Expand Tempo Range** and **Compress Tempo Range** options in the same menu.

If an external clock is being used to drive the KCS, then **MIDI** or **MIDI W SP** will be displayed in place of the tempo, and of course you will not be able to change the tempo from the control panel.

The Displays

The box below the tempo slider displays three pieces of important information. The display labeled **Min Sec** is the *play timer*, which shows the amount of time elapsed since the beginning of the song. The area labeled **METRO** (metronome) displays a pair of eighth notes that flash in time with the music. Finally, the **Meas:Bt:Step** (measure/beat/step) display shows the current location in the song, in measures, beats, and steps. All of these displays can be turned off in either the **Options** menu, or on the Environment screen.

The Left Hand Buttons

The buttons on the left side of the control panel have little in common, except that they are all controls that you are likely to access repeatedly during the course of a recording session. These buttons are described on the next few pages.

CNTRL and AFTER
These buttons are used to enable or disable the recording of MIDI controllers such as pitch bend, patch changes, and aftertouch. **CNTRL** affects all MIDI data except note data and aftertouch, and can also be toggled with the <:> (<Colon>) key. The **AFTER** function is duplicated with the <'> (<Quote>) key.

When recording controllers, if a pitch bend or sustain pedal (CC 64) event is recorded, a zero pitch bend and/or sustain pedal off event(s) are placed at the end of the recording. This prevents hanging or mistuned notes if the affected sequence is looped or joined to another sequence, either in OPEN mode or by using the **Double** or **Append** options in TRACK mode. This is helpful in most circumstances, but you may need to edit these events out if you are recording a part that is to be spliced into an existing sequence.

MERGE and RECHN
The **MERGE** and **RECHN** buttons toggle the MIDI merge and rechannelize features. MIDI merge is used to mix data from the computer's MIDI in with data from the sequencer, for transmission through the MIDI out jack. This is necessary when using the KCS in conjunction with a master keyboard to control a set of expander modules.

RECHN is similar to **MERGE**, except that data is rechannelized prior to merging and/or recording. Clicking on **RECHN** causes a display of the current rechannelize channel to appear beneath the **RECHN** button; clicking on the arrows on either side of the display will change the rechannelize channel. The rechannelize channel also contains an output port number, so you may direct the output to a specific port if you are using an output expander.

The functions of the **MERGE** and **RECHN** buttons are duplicated with the <;> (<Semicolon>) and <Backspace> keys, respectively. When **RECHN** is active, the status of the **MERGE** switch is ignored.

MUTE and SOLO

These two buttons select the **Mute** and **Solo** track functions. When **Mute** is the active track option, selecting a track will "silence", or mute, its output. A block of adjacent tracks can be muted or unmuted by holding down the left mouse button and dragging the mouse over those tracks. The status of each track will toggle as the mouse passes over it.

The **Mute** function can also be modified using the <Shift> and <Alternate> keys in conjunction with the mouse. If <Alternate> is held down while **Mute** is active and a track is selected with the mouse, that track will be muted if it is playing, but will not be unmuted if it is already muted. Conversely, holding down <Shift> while selecting a track with the mouse will unmute any muted tracks, but will not mute tracks. (Think of the <Alternate> and <Shift> keys as meaning "mute only" and "unmute only", respectively.)

The **Solo** track function is used to solo a track, that is, mute all tracks except the selected track. Selecting the track a second time will unmute the other tracks.

The **Mute** and **Solo** track functions can also be selected by pressing <F3> or <F8>, respectively. Pressing <#> (<Shift-3>) will mute all tracks, and pressing <@> (<Shift-2>) will unmute all tracks, regardless of their current statuses.

Note that muting a track which contains OFF events (which are only recorded for notes with release velocity or for notes greater than 999 steps long) could cause some notes to stick. Stopping the sequencer, or pressing the <~> (<Shift-`>) key, will clear any stuck notes.

QUANT
When this switch is on, any events recorded will be rounded to the nearest time interval in the box below the **QUANT** switch. This is similar to the **Quantize...** option in the **Transform** menu, but also affects controller and other non-note data types as well, and cannot be undone. Only quantize values represented by the available values may be selected from the Play/Record screen, but any value desired may be entered from the Environment window.

EDIT
Clicking on the **EDIT** button or pressing <F1> will stop the sequencer and transfer you to the TRACK mode Edit screen.

The PUNCH and LIVE Buttons

The buttons immediately to the right of the "transport controls" are used to control both punch recording and live editing. Punch recording is used to replace a portion of an otherwise good track, and is described below. Live editing is an advanced feature of the KCS that lets you edit tracks and swap notes between tracks in real-time, and is described on page 100.

Clicking on either the **PUNCH** or **LIVE** buttons highlights that button and changes the labels and functions of the four remaining buttons. When **PUNCH** is selected, they are labeled **SET, CLEAR, ERASE,** and **COPY,** and when **LIVE** is on, they are labeled **BKUP, RSTRE, DONE,** and **OFF.**

Punch Recording

The term "punch recording" is borrowed from multi track tape terminology, where it refers to re-recording a section of a track by punching the record button in at the start of the unwanted section and punching out at the end. Punch recording in the KCS is a little different than the same operation on a tape deck. Instead of erasing the punched portion of a track, the track is simply muted for the duration of the punch, and new data is recorded on a new track. Once a good replacement track has been recorded, the original punched data can be erased and the two tracks merged.

The punch buttons are all track functions, so only one can be selected at a time, and selecting any other track function will deselect the punch buttons. They can also be set from the **Track Functions** menu, or with keys on the computer keyboard.

SET

This button, along with the **Set Points** option in the **Track Functions** menu or the <F4> key, is used to set the start and stop points for a punch. When **Set Points** is active, selecting a track will set the start point for the punch; the track will also be muted and * will appear in the status display under **P**. Selecting the track a second time will set the end point for the punch, and the track will be unmuted and the letter **O** (for "out") will appear under **P**. If the track is *not* selected again before the track loops, the end punch point will default to the end of the track. As the track loops, the display under **P** will change from **O** to **I** (for "in") when the punched section is playing, and back again when the end punch point is reached.

If punch points have already been set for a track, then selecting that track will change either the start or end point of the punch. Selecting a track while that track is punched out will change the end punch point, and selecting the track while it is on will set a new start point. Each track can only have one set of punch points, but separate punch points can be set for as many tracks as needed.

CLEAR
This button activates the **Clear/Reset Punch** track function. Selecting a track while this function is active will temporarily remove the punch points in that track, unmute the punched section, and set the punch status to **X** (off). Click the mouse a second time to restore the punch points. The <F5> key will also select **Clear/Reset Punch.**

ERASE
This button, along with the <F6> key, selects the **Erase Punch** track function, which is used to erase the punched sequence data and optionally replace it with the new recording. When a track is selected, a prompt asking for one of three keys to be pressed will appear on the message line. Press <Y> to erase the punched data, <L> to erase the punched data and merge the track with the last track recorded (thereby replacing the punched data), or <N> to cancel the command.

COPY
This button or the <F7> key will select the **Copy Punch** track function. Selecting a track with active punch points will copy the punched data to the next empty track, and erase that data from the original track. The new track will also be muted. This serves as a non-destructive alternative to the **Erase Punch** track function.

Cueing

The box at the right side of the control panel contains controls for TRACK mode's "play from cue" feature. The **CUE** button is used to activate one of TRACK mode's six cue loops. When **CUE** is on, the sequencer will repeatedly loop the material contained between the start and end points of the current cue loop, shown in measures at the bottom of the cue controls. Clicking on **CUE** will immediately start all tracks at the beginning of the cue loop, or clicking on **PLAY** when the **CUE** button is lit has the same effect. The <Tab> key duplicates the function of the **CUE** button, and the </> (<Slash>) key turns cueing off.

Cueing (continued)

Cue loops are selected using the buttons labeled **1** to **6**, or by pressing and holding <Alternate> along with any key from <1> to <6>. The start and stop points for the selected cue loop can be changed by clicking on the arrows on either side of the start and stop points, or the <Cursor Up> and <Cursor Down> keys can be used to change the start point, and the horizontal cursor keys will change the end point. Cue points can also be set using the **Set Cue Points...** option in the **Options** menu. All six cue point pairs are saved with each .ALL file and .TRK file.

The amount the cue points move each time one of these buttons is pressed can be changed with the <Alternate> key. Normally, the cue point move amount is one measure; pressing the <Alternate> key changes this to eight measures, and pressing it again will change it back to one measure.

The current start cue point may be moved back one, two, four, or eight measures by pressing the <[>, <]>, <'>, or <=> keys, respectively. Pressing one of these keys will move the cue point back by the appropriate amount and start the sequencer at that point, though the cue loop will not be activated.

Cueing can be used for recording as well as playback. When a new track is recorded with the cue loop active, the program adds time to the beginning of that track to align it to the other tracks.

When the KCS is looping a cue, it will automatically look back through the music before the beginning of the cue loop, and find and send the most recent controller values and program change settings for each track. (We call this "controller chasing".) This ensures that the cue loop will start with each instrument on the proper program, at the correct volume, and with the proper pitch bend settings, etc.

The Options Menu

This menu contains several switches and editing operations from other parts of the KCS, that are frequently used when recording in TRACK mode.

All Tracks To Seq...
This menu item copies all tracks to a single OPEN mode sequence. It is described in detail in Chapter 4, on page 61.

Clear All Tracks...
This item brings up an edit window that lets you erase the contents of all 48 tracks. If you enter a value in the **Set Length** field, the length of track 1 is set to that number of measures; otherwise, track 1 is left empty.

Go to Measure...
This option allows you to jump to any measure in the song. After you select this option, the KCS will ask for the destination measure. Type the measure number, followed by <Return>. Playback will start from this measure when you start the sequencer.

You can also go to any measure in the song simply by clicking on the measure portion of the **Meas:Bt:Step** display. If the song is playing when you do this, playback will pause while you enter the measure number, then resume from the new measure after you press <Return>.

Set Cue Points...
This option provides an alternate way to view and edit TRACK mode's six cue loops. The edit window that appears contains a list of the six cue loops, as well as their start and stop points. If you enter a start or end point that is beyond the end of track 1, it will be resolved to the end of track 1 when the track is played.

Text...
This option brings up the sequencer's text comments page, which is described on page 71.

Seq To All Tracks...
This item copies a single OPEN mode sequence to all 48 tracks. The current contents of TRACK mode will be lost if **Clear Tracks First** is highlighted. **Seq to All Tracks...** is described in more detail in Chapter 4, on page 61.

Track Merge...
This option is used to combine two or more tracks into a single track, which can simplify the editing of tracks that are on the same MIDI channel, and frees up tracks for further recording. When **Track Merge** is selected, the message line will prompt you for a list of tracks to be merged. Select the tracks to merge by clicking on them, then press <Return>. Each track in the list will be merged with the lowest track, and then erased.

Track Merge can also be selected with the <\> (<Backslash>) key.

Auto Loop
This switch enables or disables looping in TRACK mode. When it is on, all tracks will start over when the end of track 1 is reached, or they will loop between the current cue points if cueing is active. Turn **Auto Loop** on when you want to record in drum machine fashion, or if you want to loop a cue. It should normally be off when performing or recording to tape.

Auto Record
This switch is used to automatically disable recording when the end of track 1 is reached. If this switch is on (the normal condition), the **RECORD** button will not change state when the tracks loop; if it is off, **RECORD** will be turned off at the end of the tracks.

Compress Tempo Range
Expand Tempo Range
These two items are used to set the range of the tempo slider. Only one is available at any time. If **Expand Tempo Range** is selected, the range of the slider will be 10 to 999 BPM. If **Compress Tempo Range** is selected, the range will be 40 to 240 BPM.

Filter
This switch turns on record filtering, which only allows data from a single MIDI channel to be recorded. The filter channel may be set on the Environment screen, or with the <_> (<Shift-Minus>) and <+> (<Shift-Equal>) keys.

Mute New Tracks
This switch causes tracks to be muted as soon as they are recorded. This is convenient, for instance, when recording multiple takes of a long solo over a track, since earlier takes of the solo will not be played back as the sequencer loops. It is also handy when looping over a short cue, to give you a chance to play a short riff many times while you work on getting it right.

Send to Fostex R8
This switch tells the KCS to send a special set of system exclusive commands to the Fostex R8, which will slave that instrument to TRACK mode's control panel. When this switch is on, the R8 is controlled by the sequencer's **REWIND**, **F-FWD**, **STOP**, **PLAY**, and **PAUSE** buttons. If the KCS is also slaved to the Fostex via the Phantom SMPTE synchronizer or smart FSK clock, it becomes possible to take complete control of the system through the KCS control panel, with both instruments remaining synchronized through all operations. (Note that if the KCS is not slaved to the Fostex, the two instruments will not remain synchronized during fast-forward and rewind operations.)

See your Fostex R8 manual for more details.

Silent Punch
When **Silent Punch** is on, notes that are being punched out will be muted while punch points are being set. Once the punch points are set, the punched portion of the track will be muted regardless of the setting of this switch.

The Options Menu (continued)

System Exclusive
This switch enables or disables the recording of short to medium-size system exclusive messages (5000 bytes or less). It duplicates the **Sysex** switch on the Environment screen.

Tempo Change by Ratio
When this switch is on, changing the tempo either by clicking on the arrows at each end of the tempo slider, or with the <,> or <.> keys, will change the tempo by about 2.5%. When off, either of these methods will change the tempo by one BPM.

Other Track Functions

The **Track Functions** menu contains several track functions that are not duplicated by buttons on the control panel. These functions are used to name tracks, to swap tracks, to mute and unmute alternate tracks, and to shift a track in time.

Name a Track
When this track function is selected, clicking on a track will cause the sequencer to pause and allow you to enter the name of the track on the message line.

Swap Tracks
This track function is used to swap the position of two tracks in the track display. Since notes on the lower numbered tracks are played before notes on the higher tracks, swapping tracks can be used to correct for minor timing problems caused by MIDI bandwidth limitations or differences in instrument response times. See Chapter 12 for more on sequencer timing.

Erase a Track
Tracks can be erased with this track function. When this option (which can also be selected with the <Clr/Home> key) is active, selecting a track will erase that track. A question will appear on the message line to confirm this choice. Answer <Y> to erase the track, or <N> to keep the track. Select another track function, such as **Mute**, to turn this option off.

Set Mute Switch
This track function is used to set up a "switch" which will alternately mute and unmute two selected tracks. Selecting a track after this option is chosen will change that track's status to **SW** (switch), and selecting a second track will unmute the first track and mute the second. The <Return> key can then be used to alternately switch between the two tracks. After the second track is selected, the track function will automatically change to **Mute**. The **Set Mute Switch** track function can also be selected with the <F9> key.

Shift +1, etc.
The **Shift** track functions are used to shift a track forward or backward in time, relative to the other tracks. The shift amounts are +1, +3, +12, -1, -3, and -12 steps. The <Delete> key can be used to toggle between a positive and negative shift amount when a **Shift** function is active. Note that since the <Delete> key is normally used to toggle **Align**, the **Align** feature cannot be changed from the keyboard when a **Shift** function is active.

Other Track Functions (continued)

The program cannot shift a track if its first event would be placed before the start of the track, which means that negative **Shift** values cannot be used on tracks which start on the first beat. Events shifted beyond the end of track 1 will not be played. Shifting a track changes the **TIME** value of the first event in the track by adding or subtracting the shift amount, and this change will be reflected in the event list on the Edit screen. The **TIME** value for the first event of the track will be displayed in the right part of the message line whenever a **Shift** operation is performed.

You should be careful to turn **Shift** off by selecting the **Mute** track function when you are done shifting tracks, as we have found that it is easy to accidentally mess up a track by shifting it when you really want to mute it.

Panic Button

If you end up with stuck notes for some reason, TRACK mode has a "panic button", which sends an All Notes Off message on all 16 MIDI channels on each active MIDI port, as well as sustain pedal off and zero pitch bend messages for the appropriate channels. Press the <~> (<Shift-'>) key to activate the panic button.

MIDI Song Pointer

If a MIDI song pointer message is received while in TRACK mode, the program will start all tracks from the specified point. Song pointer messages will be ignored if the clock source, in the **Environment** menu, is not set to **Song Pointer**. The correct time value will be inserted at the beginning of any track that is recorded after a song pointer message is received.

Song pointer is sent by the sequencer at the beginning of the cue loop, if cueing is activated and if **Song Ptr Send** has been enabled, as described on page 133.

Count-in

If a count-in has been set on the Environment screen, and if the **Count-in** switch is turned on, the program will wait for the programmed number of steps before starting to play or record. For example, a value of 960 will create a one measure count-in. The metronome will sound during the count-in. See page 137 for more on the count-in.

Velocity Pedal

The velocity pedal feature of the KCS allows you to modify the note-on velocities of a part being recorded with a continuous controller. This can be used, for example, to play accents on synths which recognize velocity but don't send it, or to do a MIDI mixdown on a synth which recognizes velocity but not volume control. In conjunction with the live edit feature described on page 100 or the loopback recording technique discussed in Chapter 12, the velocity pedal can be used to affect velocities of previously recorded tracks or sequences as well.

When velocity pedal is active, all continuous controllers on the velocity pedal channel (which is set from the Environment screen only) will be combined with the note velocities of the incoming MIDI data in one of three ways. The three velocity pedal modes are selected with the <F19> (<Shift-F9>) key, which is also used to turn the velocity pedal on or off. When the velocity pedal is on, control changes on the velocity pedal channel are not recorded or merged by the program. Pitch bend and aftertouch are not used for the velocity pedal.

Pressing <F19> once selects the **FULL** velocity pedal mode, where the note-on velocities are simply replaced with the last controller value received. **FULL** is most useful when recording a part from a non-velocity sensitive keyboard, which is played on a velocity sensitive slave. A mod wheel or foot pedal can be used to set the note velocity between 1 and 127, regardless of how hard you strike the keys.

Velocity Pedal (continued)

MIX averages the last controller value received with the velocity of the note. This is most useful for making minor changes in a previously recorded track using live edit or loopback recording.

SCALE combines the last controller value and the note velocities in such a way that the controller has more effect at the top and bottom of its range, but very little near the middle. For example, if the controller is at or near 1, the recorded velocities will be at or near 1, no matter how hard the keys are struck. If the controller is at or near 127, the recorded velocities will be at or near 127. BUT, if the controller is near 64 (the center of its range), the recorded velocities will be determined mostly by the note velocities sent by the keyboard. **SCALE** is best suited to major editing on prerecorded tracks or sequences, using live edit or loopback recording.

Note that the velocity pedal channel, on the Environment screen, need not be set to the channel that the keyboard or receiving synth is on, but must be set to the channel of the device with the continuous controller being used.

Live Edit

Live edit is an advanced feature of the Keyboard Controlled Sequencer which allows you to delete notes from a track or alter their velocities in real-time, as the sequencer is playing. Since live edit is much more complicated than the other features of TRACK mode, we recommend that you become thoroughly familiar with the rest of the KCS before diving into live editing.

Live edit is activated by selecting the **Edit Select** track function, either from the menu or with the <F17> (<Shift-F7>) key. When this option is selected, the words **EDIT SELECT** will appear in the message line, and the **PUNCH** buttons will be replaced by the **LIVE** buttons. The edit buttons are used to handle backup tracks and to turn live editing off, and the <Alternate>, <Control>, <Left Shift>, and <Right Shift> keys are used to edit the selected track.

When a track is selected, the letters **ED** will appear in its status display, and a backup track will be created in the first available track. The track can now be edited with the keys mentioned earlier.

<Right Shift> will delete notes that play while it is held down, by replacing them with DE events.

<Alternate> will replace note velocities with velocity value Y from the step-time record screen, which defaults to 127. If one of the three velocity pedal options is selected, pressing <Alternate> will set the note velocities from the velocity pedal.

<Left Shift> will replace note velocities with step-time velocity value W (default 64).

<Alternate> plus <Left Shift> will replace note velocities with step-time velocity value U (default 16).

<Control> will replace notes in the edit track with notes from the backup track. Normally, this acts as an "undo" command, but can also be used as a compositional device if the backup track is changed from the Edit screen. For instance, if the backup is transposed up an octave, then pressing <Control> will have the effect of transposing notes up an octave when it is pressed.

The buttons under the **LIVE** button are used to manage the current edit track's backup track, and to disable or exit from live edit. Clicking on a live edit button will affect only the currently selected edit track.

The **BKUP** button will replace the backup track with the edited track. Use this only when you are satisfied with any editing you have done, and be careful, as the original track will be lost when this button is pressed.

RSTRE is the opposite of **BKUP**. It restores the edit track from its backup track. Use this when you make catastrophic mistakes in your editing.

Live Edit (continued)

DONE changes the status of the track from **ED** to **PLAY**, turns off live editing for that track, and replaces the **LIVE** buttons with the **PUNCH** buttons. The backup track can be deleted as well, if desired.

OFF temporarily disables the editing keys, without turning live edit off. This allows you to select functions which require the <Shift> keys, such as velocity pedal or certain track functions. Note that **OFF** doesn't turn live editing off--that is done with the **DONE** button.

Chapter 6

OPEN Mode Play/Record

OPEN mode is the Keyboard Controlled Sequencer's generalized sequencing mode. In OPEN mode, you can define up to 128 independent sequences, any number of which may be played back simultaneously. These may be completely independent of each other, or some sequences may include commands to start and stop other sequences. A sequence which starts or stops another sequence is called a *control sequence*. By chaining control sequences together, you can realize very complex pieces of music. Chapter 4 describes how you can create control sequences using the Edit screen.

There are two types of sequences: *primary* and *secondary*. Primary sequences are designated by the numbers 1--9 and the letters A--Z, and are activated from the OPEN mode Play screen by pressing the corresponding key on the typewriter keyboard. Secondary sequences are designated by the two digit numbers 00--92. They are activated from the OPEN mode Play screen by typing two digits on the numeric keypad on the right side of the computer keyboard.

The Play/Record Screen

Entering OPEN mode from the TRACK mode Edit screen will place you on the OPEN mode Edit screen. The Play/Record screen may be entered by pressing the <F1> key, by double-clicking the right mouse button, by clicking on **Play Screen**, or by single-clicking the right mouse button while holding down the <Shift> key. The program uses the same screen for both play and record operations.

The Play/Record Screen (continued)

An important difference between OPEN mode and TRACK mode is that going to the OPEN mode Play screen does not automatically allow you to record. To record in OPEN mode, you must either select the **Record** option from the Edit screen, or activate OPEN mode real-time recording from the Play screen. This procedure is described in detail later in this chapter, on page 111.

The OPEN mode Play/Record screen looks like this:

```
S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W
1  1 BellPiec 1      |2  1 ESOSETUP      |3 99 VolPedal 1 1  |4 99 Stokasm1
5 99 Vary 3   3 A    |6 99 Vary 3        |7 99 Seq 5         |8 99 Vary 3
9 99 Vary 3          |A 99 BelPiece 2 1  |B 99 Seq A         |C 99 Vary B
D 99 Seq B           |E 99 Seq 6         |F 99 Seq 8         |G 99 Seq C
H 99 Seq 5           |I 99 Seq 6         |J 99 Seq 8         |K 99 Seq C
L 99 Stokasm2        |M 99 BelAir        |N  1 Stokasm       |O 99 Ch  1 CC
P 99 StokVol         |Q  1 BachInv1      |R  1 Chopin W      |S 99 Vary 7
T 99 Vary E          |U 99 Vary C        |V 99 StokLd 1      |W 99 Cloud
X 99 StrngPad        |                   |Z 99               |00   Classic
01   Right           |02   Bach T&F      |03   Haydn S       |04   Mozart S
05   W. Tell         |06   Jim'sJam      |07   Setup         |08   AltSax+
09   Vibes+          |10   CoolJazz      |11   GMinFuge      |12   BachInl2
13   TigerRag        |14                 |15                 |16
17                   |18                 |19                 |20
21                   |22                 |23                 |24
25                   |26                 |27                 |28
29                   |30                 |31   Seq 13        |
                     |                   |                   |
37   >>Show<<        |                   |39   >>Demo<<      |
                     |                   |                   |
CUE SEQUENCE 1                  CUE POINT    1
CLOCK:  108 BEATS/MINUTE        MEASURE   5:01:004          F1 to exit
```

OPEN Mode Play Screen

The Play screen consists of two areas: the *sequence area* at the top, and the *status lines* at the bottom of the screen. The sequence area shows the status of the 35 primary sequences and the first 45 secondary sequences. (The remaining secondary sequences can be played from this screen as well, but no status information is shown for these sequences.) Four consecutive sequences are displayed on each line. The **P**, **F**, and **W** columns contain information concerning the status of each sequence. The **S** (Sequence) column contains the designator for each of the 80 sequences displayed. The **RE** (repeats) column shows the number of repeats programmed for each sequence. A 99 in the **RE** column means that the sequence will loop indefinitely. **NAME** shows the name of each sequence. The **P** (Play) column shows the number of times each sequence has left to play, and counts down as each repetition of the sequence occurs. A 9 will be displayed in the **P** column if that sequence has nine or more repeats left to play. The **F** (From) column contains the letter or number of the control sequence that started the sequence. This field is blank if the sequence was started from the computer keyboard. A W in the **W** (Wait) column indicates that the sequence is currently waiting for another sequence to finish, and an M means the sequence is currently muted.

The status lines at the bottom of the screen display information about various record and play options, and also show the measure/beat/step counter, the play timer, and the clock source or tempo. The words **RECORD, CUE, MIDI MERGE, PAUSE,** etc. will appear on the status lines when these features are activated, and disappear from the status lines when they are de-activated. The current cue point and cue sequence are also shown.

Clock, Metronome and Measure/ Beat/Step Display

The current clock source is displayed next to the word **CLOCK** on the next to last line. This will be the current clock rate in beats/minute if the internal clock is being used, **MIDI** if MIDI clock is being used without song pointer, or **MIDI WITH SP** if MIDI clock is being used with song pointer.

If the internal clock is in use, the clock rate can be changed during play by using the <,> (<Comma>) key to increase the tempo, or the <.> (<Period>) key to decrease the tempo. The clock rate can also be changed from within a sequence using TM, AC, or DC events, or from the Environment screen, described in Chapter 9. The clock source can be set in the **Environment** menu.

The measure/beat/step counter displays the current measure and step being played. It will be reset to measure 1 if you press <Undo> to stop all sequences or <Clr/Home> to erase the current recording. It will be set to the cue or song pointer location if you start a cue or a song pointer message is received.

The program provides both a visible and an audible metronome. The visible metronome appears in the bottom right hand corner of the screen. The audible metronome can be heard through the speaker of your monitor. The separation between metronome clicks can be programmed from the Environment screen.

Playing Sequences

Primary sequences 1--9 and A--X are started by pressing a key on the typewriter keyboard, and secondary sequences 00--92 can be started by typing a two digit number on the numeric keypad. (Primary sequences 1--9 cannot be started from the numeric keyboard, nor can secondary sequences be started from the typewriter keyboard.) If **Align** is turned off, the sequence will start immediately; otherwise it will wait for the beginning of the next measure and then start.

The numeric keypad also has a "bank lock" feature, which allows selecting any secondary sequence from within a bank of ten sequences using a single key. Pressing the <*> key on the numeric keypad after entering one or both digits of a secondary sequence will lock the 10's place (the first digit) of that number, and subsequent numeric keypad digits will immediately start the appropriate sequence in the bank. For example, pressing <*> on the numeric keypad after pressing <1> will lock the 1 in as the first digit of the secondary sequence, and pressing numeric keys <2>, <3>, and <4> will start sequences 12, 13, and 14. Bank lock is turned off with the <(> (<Left Parenthesis>) key on the numeric keypad. The most recently started secondary sequence is displayed in the lower right corner of the screen, which is helpful when you are using the bank lock feature, and the word **BANK** will appear beside the sequence number if bank lock is turned on.

Normally, the sequence will play for the programmed number of repeats and stop. To stop a sequence from looping, press the appropriate sequence key or numeric keypad number once. The sequence will play to the end and then stop. To stop a sequence immediately, press the sequence key or number twice if it is looping, or once if it is in its last play. To play several sequences at once, press the <Esc> key to put the program into pause, start the sequences, then press <Esc> again.

Muting Primary Sequences

To mute any primary sequence that is playing, press <Shift> and the sequence key simultaneously. An **M** will appear under the **W** heading for the sequence. The sequence will continue to keep time, but no events will be sounded. Notes currently playing will be shut off unless they were defined with separate ON and OFF events. Such notes will stick until <F1>, <Help>, or the panic button (<~>) is pressed.

To unmute a sequence, press the sequence key again (no <Shift> this time). The **M** will disappear and the sequence will resume sounding at the same point it would have been at, had the mute feature not been invoked. Use mute to cue in and out multiple overdubs in real-time, or to isolate and listen to individual sequences.

Secondary sequences cannot be muted from the OPEN mode Play screen, though they can be muted and unmuted with MS and US events.

Cancel

Pressing the <Undo> key will cancel, or stop, all active sequences, and set the measure counter to 0. If you are currently recording, it will erase the recorded sequence and allow you to start recording again. Cancel will not erase a sequence which you recorded earlier in the current play/record session.

Pause

The <Esc> key can be used as a pause button during playback or record. Pressing <Esc> shuts off any notes being played and stops the internal clock, or if MIDI clock is being used, all clocks will be ignored until the pause button is pressed again. The word **PAUSE** is displayed on the middle status line until it is de-activated or you leave the Play/Record screen.

Notes played on the keyboard are not recorded when paused, but the last controller of each type played is recorded, if the **Controllers Pause** switch is active on the Environment screen. See Chapter 9 for more details.

Cueing

The <Tab> key activates the cue feature. Each time you press the <Tab> key the cue sequence will begin playing from the cue point. Program changes that occur earlier in the cue sequence will be sent over MIDI, and sequence start events and tempo changes will be executed.

The cue sequence is set from the Play/Record screen with the left and right cursor control keys. The <Cursor Left> key decreases the cue sequence by one, and the <Cursor Right> key increases the cue sequence by one.

The cue point determines where playback will begin in the cue sequence. This also can be changed from the Play/Record screen using the <Cursor Up> and <Cursor Down> keys and the <Alternate> key. The up arrow moves the cue point higher, the down arrow moves the cue point lower, and <Alternate> toggles the amount that the cue point moves between one measure and eight measures.

The cue feature is particularly useful when the cue sequence is a control sequence that plays an entire piece. You can use cue to hear the piece starting from any point. By keeping alternate arrangements of your songs on consecutive sequence keys, you can quickly go back and forth between the same point of different arrangements of a piece with the cursor keys.

Align

When activated, **Align** forces the program to wait till the end of a measure before exiting the record mode. This assures that all sequences recorded will loop properly. **Align** also forces all sequences that are started from the computer keyboard to wait until the beginning of the next measure before playing.

Align is normally on. It can be toggled on or off with the <Delete> key.

Environment

The Environment screen can be reached directly from the OPEN mode Play screen by pressing the <0> (<Zero>) key. The Environment screen is described in Chapter 9.

MIDI Merge and Rechannelize

MIDI merging is activated by pressing the <;> (<Semicolon>) key. All incoming MIDI data, including system exclusive messages, received by the computer is merged with the sequence data being played. Press the <;> key again to de-activate MIDI merging. MIDI merging is replaced by rechannelization when **Rechannelize** is on.

If multiple MIDI outputs are in use, MIDI merging is affected by the settings in the output map, as described on page 130.

The **Rechannelize** feature is used to rechannelize MIDI data recorded by the program and send it out the computer's MIDI out. This allows you to record on any channel while using a keyboard controller that transmits on a single channel. If rechannelize is active, the word **RECHN** will appear on the bottom of the screen, followed by the output channel and port letter. You can use the <Backspace> key to toggle rechannelization on and off from the Play/Record screen, and use the <>> and <<> (<Shift-Period> and <Shift-Comma>) keys to increase or decrease the output channel and port.

Filter

The KCS's **Filter** feature is used to force the sequencer to accept MIDI data on only one channel, the filter channel. Incoming data on other channels is ignored. Filtering is turned on with the <)> (<Right Parenthesis>) key, and the filter channel can be lowered or raised with the <_> (Shift-Minus>) or <+> (<Shift-Equal>) keys, respectively.

Exit

Pressing <F1> will immediately end the play/record process and take you directly to the Edit screen. The left mouse button duplicates this function in OPEN mode.

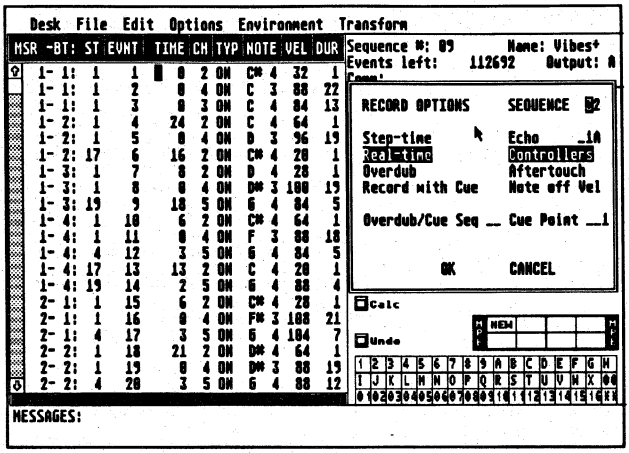
Panic Button

Pressing the <~> (<Shift-'>) key will send All Notes Off messages on all 16 MIDI channels, on all active MIDI output ports. This is useful for canceling stuck notes on any synthesizers that, for one reason or another, did not receive a note-off message. The All Notes Off message is not recognized by all instruments, so this button may not always clear all stuck notes. The panic button also clears any sustain pedal or pitch bend settings that may have been left "hanging".

Recording in OPEN Mode

OPEN mode recording can be selected in one of two ways. Clicking on **Record** from the OPEN mode Edit screen will bring up an edit window which allows you to select one of four recording methods, or pressing the <Return> or <Enter> keys on the OPEN mode Play screen will enable real-time recording. Generally speaking, selecting **Record** from the Edit screen provides more flexibility in recording, while the <Return>/<Enter> method is more convenient if you are playing an OPEN mode sequence and want to record a part whenever inspiration strikes. Real-time recording is described later in this chapter, on page 113.

When you select **Record** from the Edit screen, an edit window will ask which sequence you want to record, and will also present a set of record options. The sequence will default to the next empty sequence, or you can enter a sequence. Enter one key for a primary sequence or two digits for a secondary sequence. Remember that sequences Y and Z are reserved for internal use by the program and cannot be recorded.



OPEN Mode Record Options

Four record options are displayed in the left part of the edit window, one of which must be selected. **Step-time** allows you to create a sequence using a method similar to step mode entry on a drum machine. Step-time entry is useful for entering fast arpeggios, regular chord patterns or other parts with few changes in note to note timing. The step-time recording process is described in detail in Chapter 7.

Real-time records events from the synthesizer keyboard in real-time. In this mode the program is similar to a tape recorder, recording all notes as you play. **Overdub** will automatically play the overdub sequence and set the length of the current sequence to match that of the sequence you are overdubbing to. You must select an existing sequence to overdub to if you choose **Overdub, Record with Cue** is another way to record a new sequence in sync with an existing sequence. **Record with Cue** differs from **Overdub** in that the existing sequence may be started at any measure. It is particularly useful when the existing sequence is a partly completed song that you want to add parts to in specific places. You must select an existing sequence to be the cue sequence. The real-time record options are described in detail later in this chapter, starting on page 113.

Controllers, Aftertouch, Note Off Vel, and Rechn

These record options set the sequencer to record or ignore MIDI controllers, aftertouch, and note-off (release) velocity. **Controllers** enables the recording of pitch bend, control changes, and program changes. If a pitch bend or sustain pedal (MIDI controller 64) event is recorded, a zero pitch bend or sustain pedal off message will be placed at the end of the recording. **Aftertouch** controls the recording of aftertouch (pressure) information. Since aftertouch and controller data use such large chunks of memory, it is best to disable **Controllers** and **Aftertouch** unless specifically required.

Note Off Vel allows separate storage of note-off events, including note-off velocity. There are only a few synths capable of sending and receiving note-off velocity. Notes recorded with note-off velocity are stored as separate note-on and note-off events, and are more difficult to edit. The KCS can only remember to hold down 64 notes (on all synths) at one time using ON events, so if you need more than that, you need to record some parts with note-off velocity.

The letters **C A O** will appear beside **RECORD** on the Play/Record screen if any of these options are turned on. The options can also be turned on and off directly from the Play/Record screen. The <:> (<Colon>) key toggles controllers, the <'> (<Quote>) key aftertouch, and the <"> (<Double Quote>) key note-off velocity.

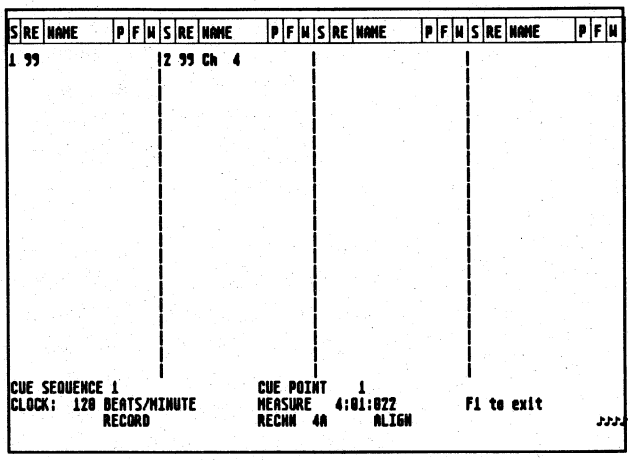
Rechannelization can also be toggled from this window. **Rechn** is described on page 110.

Real-time Record

If you select the **Real-time**, **Overdub**, or **Record with Cue** options, the Play/Record screen will be displayed. The only visible differences between play and record are that the words **RECORD** and **ALIGN** appear at the bottom of the screen along with any other active record options.

Real-time Record (continued)

The following example shows the screen that would appear if your first action in OPEN mode is to record sequence 2, with rechannelization to channel 4, output A. The number of the sequence being recorded is shown in red.



OPEN Mode Recording

When you begin playing on the synth keyboard, the metronome (bottom right of screen) will begin flashing and the measure/beat/step counter will start counting up. A metronome will also sound on your monitor speaker. If you did not specify a name, the MIDI channel of the first event recorded will be displayed under **NAME**. If you want to begin the sequence with a rest, press the <F10> key to start the sequencer before you start to play.

If, during recording, you make a mistake and wish to start again, press the <Undo> key. The current recording will be erased and the program will start recording again when you play the keyboard or press <F10>. When you have finished recording press <F10> and the sequence will begin playing back immediately if **Align** is off, or when the measure completes if **Align** is on.

If your new sequence is playing back and you decide you don't like it, you can erase it and record again by pressing <Shift-Del>. Recording will start again when you play the keyboard or press <F10>. Press <F10> a second time to end recording and hear what you just played.

All of the play features described earlier in this chapter also function when recording. To stop recording and go to the Edit screen, press <F1>.

As mentioned earlier, real-time recording can also be selected directly from the OPEN mode Play screen by pressing the <Return> or <Enter> key. If <Return> is pressed, recording will start as soon as a note-on or other relevant MIDI event is received at the MIDI in jack, and if <Enter> is pressed, recording begins immediately. The first unused sequence will be used for recording. Pressing <F10> will turn recording off and play the newly recorded sequence, pressing <Undo> will erase the current recording and stop all sequences, and the <Clr/Home> key will erase the last sequence recorded in the current session.

Additional OPEN mode sequences can be recorded in a single real-time recording session by pressing either <Return> or <Enter>, even if recording was initiated from the Edit screen. This process can be repeated as many times as needed, to record additional sequences.

Overdub

The **Overdub** option allows you to record a new sequence in sync with an existing sequence called the *overdub sequence* which is automatically played back by the program as you record. You can start the overdub process by playing a note on your synth or by pressing <F10>. In either case, the overdub sequence will automatically be started and recording will begin.

Overdub (continued)

When the overdub sequence completes, the program will automatically end the recording process and play back both sequences together. If you make a mistake during recording or are dissatisfied after the recording, you can use the <Undo> or <Clr/Home> keys to start over, as described on page 115.

Since the overdub sequence can be any OPEN mode sequence, including a control sequence, it is possible to overdub a sequence to a section of a song, or an entire piece. Overdubbing to a control sequence is done in the same manner as overdubbing to any other sequence.

If you start the overdub sequence with <F10> and don't play any notes at all before it ends, the overdub sequence will still loop, and the program will remain in record. This allows you to listen to your overdub sequence a few times before recording.

Record with Cue

Record with Cue is very similar to **Overdub**, but allows you to start the overdub sequence at any measure. This is useful for things like adding tom fills to a section, adding some grace notes to a long piano sequence, or adding controllers to a piece after the basic arrangement is done. The program will automatically insert the correct amount of time before the first event.

When the **RECORD OPTIONS** edit window is displayed, select **Record with Cue** and then click the mouse to **Overdub/Cue Seq**, and enter a sequence key or number. If you select an unused sequence, the program will alert you. You can also set a new cue point at this time. This will be the measure at which the program will start the cue sequence.

When you get to the Play/Record screen the cue sequence and cue point displays will reflect the values you entered. Play a note or press <F10> to start recording. The cue sequence will begin playing at the specified cue point. Press <F10> when you have completed recording. Both the cue sequence and sequence you recorded will start playing back from the specified cue point. You can restart both sequences at any later time by pressing <F10> or <Tab>. If you make mistakes and want to start over, you can press <Undo> if you are still recording or <Clr/Home> if you have completed recording. The program will erase your recording and return to the beginning of the recording procedure.

Recording with Velocity Pedal

When the **Velocity Pedal** option has been activated from the Environment or TRACK mode record screens, the sequencer will not directly record note-on velocities, but will instead record values based on the position of any continuous controllers on the velocity pedal channel. The velocity pedal function cannot be accessed from the OPEN mode Play/Record screen. See page 99 for more information on the velocity pedal.

Recording with a Count-in

The **Count-in** switch, in the Environment screen, lets you use the metronome to get the feel for a few beats before recording. If you are using a count-in, press <F10> when you are ready to record or overdub. The program will sound the metronome, but it will not start recording or start the overdub sequence until the number of steps specified for the count-in have passed. See page 137 for more on setting a count-in.

MIDI Song Pointer

If the **MIDI w Song Pointer** clock source option was selected from the Environment screen, and the program receives a MIDI song pointer message during OPEN mode play, the program will turn off all active sequences, and start the current cue sequence at the point specified by the song pointer message. The only MIDI events that will be sent while the program is chasing the song pointer are program changes. It may take a few seconds for the program to chase many measures into a complex piece, and songs with a lot of continuous controller data will take a little longer than other songs.

Recording with song pointer is similar to recording with cue. If the clock source has been set to **MIDI w Song Pointer**, and the program receives a song pointer message, the cue sequence will be started at the location specified by the song pointer message, and recording will begin. If a second song pointer message is received, and no notes have been recorded, the program will start the record process again.

If a second song pointer message is received after some notes have been recorded, the program will end recording and play back both the cue sequence and the newly recorded sequence, starting at the song pointer location. You can still use <Clr/Home> to erase the new sequence and restart the recording process.

Chapter 7

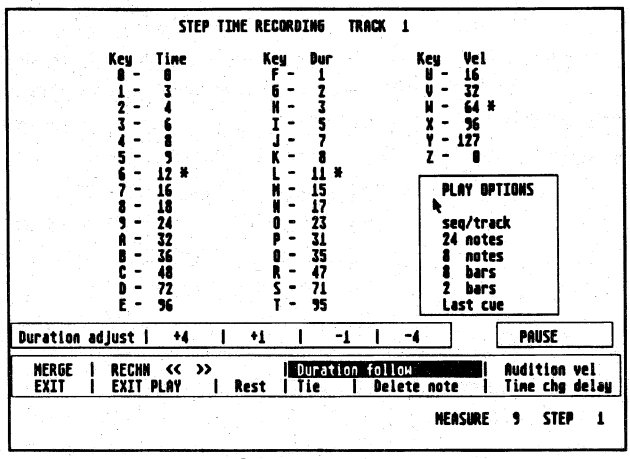
Step-Time Recording

The step-time recording features of the KCS allow you to record note information from your synthesizer keyboard, while using the computer keyboard or mouse to specify timing information. Note velocity can be specified from either keyboard. This can be a faster and more intuitive way of precisely entering rhythmically regular passages than the typing method described in Chapter 4. It is particularly convenient in TRACK mode, as the new passage can be played along with tracks that were previously recorded.

The step-time recording screen contains fifteen choices for note times, fifteen choices for note durations, and six choices for note velocity. The current choices are indicated by a red asterisk. As you play notes on the synth keyboard they are recorded with the current time, duration, and velocity values. Each choice is assigned to one of the numeric or alphabetic keys shown to the left of the possible values. You can make a new choice for time, velocity, or duration by pressing the appropriate key on the computer keyboard, or by clicking the mouse on your choice. The red asterisk will move to display your choice. If you select a zero velocity, which is normally assigned to the Z key, the program will record the actual velocity with which each note is played on your synth.

A new OPEN mode sequence can be recorded in step-time by selecting the **Step-time** option from the record dialog box. A new track can be recorded in step-time by selecting the **Step-time Track...** item from the **Options** menu. If you pick this option, the program will allow you to select the measure at which you will start recording. You can also extend an existing sequence or track using step-time record by selecting **Step-time Append...**. The step-time recording procedure is the same in any case.

The step-time record screen is shown below:



Step-time Record

The choices for time, duration and velocity are listed in columns, along with the keys used to select the choices.

The bottom line shows the current measure and step, which will be the **MSR-BT:ST** value for the next note entered*. The box directly above this contains buttons for a number of step-time recording options, as well as two exit buttons.

Recording in Step-time

Once the various record parameters are set up, recording in step-time is simply a matter of entering the notes for each step from the synth's keyboard. Pressing and releasing a single key puts a single note at that step; pressing more than one key before any key is released puts a chord at that step. All notes played will be assigned the chosen duration and velocity values. The first note or chord will get a time of 0, while subsequent notes get the selected time value. The measure and step counters will be updated as each note is played.

* Note that this part of the KCS does NOT keep track of beats; you will need to calculate them by hand from the step values if they are needed.

While recording, you can select a new time, duration, or velocity value from any of the choices displayed by pressing the key shown next to the desired value, or by clicking on the new value with the mouse. The asterisk moves next to your choice, and subsequent notes will use the new choice.

If **Duration Follow** is highlighted, selecting a new time will cause the program to select a new, proportional duration as well. This is convenient when entering data with a lot of different time values. The durations of the last note or chord entered will also be adjusted to the new value if **Duration Follow** is on. This prevents the previous note from overlapping the new one if the time is reduced. **Duration Follow** is on when the step-time record screen is first entered, and can be turned on or off with the <F4> key.

Changing the Time, Duration, and Velocity Values

You can easily enter time, duration, or velocity values other than the ones initially supplied by the program. While holding the <Shift> key, press the key for the time, duration, or velocity value you wish to alter, or place the mouse pointer on the value to be changed and click both mouse buttons together. A red ! will appear next to the selected value at the top of the screen and the message line will prompt you for a new step-time value. You may enter up to a three digit number. If you enter a one or two digit number press <Return>. The new value will appear on the screen, and will be selected as the current value.

The fifteen time and duration values, as well as the five preset velocity levels, are stored along with other sequencer parameters in .ENV (environment) files, which are described in more detail in the next two chapters.

Time Chg Delay

Normally, selecting a new time value when entering a step-time sequence or track causes the next note played to get the new time value. Enabling **Time chg delay** causes the new time value to be assigned to the next note entered, rather than the current note. This is more natural when entering a score from sheet music. **Time chg delay** can be activated with the mouse, or by pressing the </> (<Slash>) key. The default setting for this switch is off, but many users of the KCS find the on setting more intuitively obvious.

Rest, Tie, and Delete

Click on **Rest** or press the <F3> key to insert a rest in your recording. The measure and step counters will be increased, and the time value of the next note will be increased by the current time value. Click on **Tie** or press <Return> to enter a tie. This will increase the time and also add the current time value to the duration of the most recently recorded note or chord. Clicking on **Delete** or pressing <Undo> will delete the last note or chord entered.

Play Options

The **PLAY OPTIONS** allow you to play back part or all of the sequence or track being entered. Each option can be selected by clicking on that option, or by pressing a key on the computer's keyboard.

seq/track plays the current sequence or track from the beginning, and can also be selected by pressing <F6>. **24 notes** and **8 notes** cause the last 24 or eight notes entered to be played; the associated keys are <F7> and <F8>, respectively. Play can be stopped with the <F1> key or left mouse button, or restarted with <F10> or the right mouse button.

8 bars and **2 bars**, or the <F9> and <F10> keys, let you hear the last eight or two bars of your recording. In OPEN mode, you will hear the sequence in isolation; but in TRACK mode, all previously recorded and unmuted tracks will also be heard. The cue point will also be reset if you use these options in TRACK mode. In OPEN mode, **Last cue** or the <Tab> key will play the current cue sequence from its cue point. If the current cue sequence is a control sequence that plays the sequence being recorded, this allows you to hear your recording in context. In TRACK mode, **Last Cue** will play all tracks from the current cue point. You can interrupt or restart play as described earlier.

Audition Velocity

If you are not sure of the dynamics you wish to use for your recording, you can use the **Audition vel** feature to try different note velocities until you find the one that sounds best. Use the mouse, or press <F5> to activate **Audition vel.** New notes will not be recorded; instead the current velocity selection will be changed to the velocity of each note as it is played. When you decide that you like the velocity of the last note played, press <F5> again. Recording will resume using the new velocity value.

Note that if you're using a keyboard that sends release velocity, the current velocity selection will change when you release a key, as well as when a key is pressed. In this case, be sure to turn **Audition vel** off before releasing the key.

Duration Adjust

Clicking on one of the four **Duration adjust** values, or pressing one of the four cursor control keys allows you to make small adjustments to the current duration selection, and to hear the result in the context of the current time value. Press the <Cursor Right> key to increase the duration by one, the <Cursor Left> key to decrease by one, the <Cursor Up> key to increase by four, or the <Cursor Down> key to decrease by four. The most recently recorded note will be played eight times, with the new duration and the current time and velocity values. If no notes have been recorded yet, a middle C will be played.

Pause

If you want to play some notes without recording, press the <Esc> key. The word **PAUSE** will appear, and the program will stop recording. Press <Esc> again to resume recording.

RECHN and MIDI MERGE

If you are using a master keyboard and an external synth module, you will need to activate either **RECHN** or **MIDI MERGE**, just as you do on the other screens. These functions can be selected and the output channel and port changed with the mouse or the <Backspace>, <;> (<Semicolon>), <>> (<Shift-Period>), and <<> (<Shift-Comma>) keys, as described in Chapters 5 and 6.

If **RECHN** or **MIDI MERGE** is on while in step-time record, the velocity of all notes received from MIDI will be reset to the currently selected velocity before the notes are transmitted to the MIDI out jack.

Exit from Step-time

Click on **EXIT** or press <F1> to go to the Edit screen, or use **EXIT TO PLAY** or <F2> to go to the Play screen.

Chapter 8

The File Menu

The KCS uses several different types of disk files to store the data used by the program. Each file type has its own extension. The disk operations are accessed through the **File** menu.

File Types

The various file types used by the KCS are identified by three letter extensions. The primary file type used is the .ALL file, which contains the data for all 48 tracks and 128 sequences, along with the six cue points and all of the information contained in the environment (.ENV) file, described below.

.SEQ files hold a single track or sequence. The file saved will be the currently selected sequence; when loaded, the file will be put in the next available sequence.

.TRK files hold all 48 tracks, plus their statuses, as well as the start and stop points for the six cue loops.

.ENV files are environment files, and contain most of the parameters displayed in the Environment edit window, as well as the time, duration, and velocity values used in step-time recording. If a file named DEFAULT.ENV is saved on the KCS program disk, this file will be loaded when the program boots.

.MID files are sequence files saved in the standard MIDI file exchange format. This allows you to exchange sequences with other programs that support the MIDI file format. The KCS supports both format 0 (single sequence) and format 1 (multiple track) MIDI files.

Options

The **File** menus contain a number of options which vary from one mode to another.

New

New clears the entire contents of the KCS's memory, with the exception of the settings on the Environment screen. An alert box will ask if you're sure you want to do this before performing this operation.

Open...
Save...

Open... opens and loads an existing .ALL file. **Save...** saves the contents of the KCS in a .ALL file, after asking for a file name.

Load ENV File...
Save ENV File...

These options allow you to load or save an environment file. This information is also saved in each .ALL file, as mentioned earlier, but these options allow you to store this information separately as well. The contents of the environment file are discussed on page 145.

Load TRK File...
Save TRK File...

These options are used to load or save the contents of all 48 tracks. These options are only available in TRACK mode. When a .TRK file is loaded, the existing contents of TRACK mode are lost.

Load SEQ File...
Save SEQ File...

These options are used to load or save individual sequences. These options are only available in OPEN mode. When saving a sequence, the current edit sequence is saved, and when loading a sequence, the next empty sequence slot is used.

Load MID File...
Save MID File...
These options are used to load or save single sequences or all 48 tracks in standard MIDI file format. In OPEN mode, **Save MID File...** saves the current sequence in a format 0 MIDI file, and in TRACK mode, the save operation saves all 48 tracks in a format 1 file. When loading a MIDI file, the KCS checks the file format, and automatically places all format 0 (single sequence) files in the next available OPEN mode sequence, and format 1 files in all 48 tracks, regardless of the current KCS mode. If the steps/beat setting in the MIDI file differs from that in the KCS, the program will ask if you wish to convert the times of the MIDI file to match the current **Steps/Beat** setting.

Quit
Quit will exit from the KCS and return you to the Desktop. Be sure to save your data before quitting. An alert box will ask you to confirm this choice.

Caveats

One point to be aware of when saving long files is that a computer with one meg or more of memory can hold many more notes than can fit on a single disk. A double sided disk can hold about 120000 notes, and a single sided disk only holds about half this number. If you somehow find yourself with more notes than will fit on a single disk, you will have to save some individual sequences in .SEQ files, then delete them and save the remaining data.

CAUTION: With the exception of the default environment file mentioned earlier and the KCS.INF file, you should NEVER save your data files on the KCS key disk! This could cause conflicts with the program's copy protection, which will make it impossible to open the program. The lock tab on the program diskette should be left open at all times, except when saving a default environment file or a modified KCS.INF file.

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Chapter 9

The Environment Menu

The **Environment** menu contains many options for changing the KCS's operating "environment"--that is, global settings that affect the operation of the program as a whole. Many of the options in this window are duplicated in the Environment window, which may be reached by clicking on **Full Environment...**, or in the TRACK mode **Options** menu.

The Environment Menu

Full Environment...
This option is used to bring up the Environment window, which gives full access to all of the KCS's environment variables. The Environment window is described beginning on page 132.

Internal Clock
MIDI Clock
Song Pointer
These three switches allow you to select the clock source for the KCS. The **MIDI Clock** switch selects an external MIDI clock without song pointer, and **Song Pointer** selects MIDI clock with song pointer. See page 142 for more details.

Audible Metronome
Visual Metronome
These switches enable or disable the metronome click that is produced by the monitor speaker, and the musical icon metronome that is shown on the TRACK mode and OPEN mode Play/Record screens. Both are duplicated on the Environment screen.

Count-in
This switch activates the sequencer's count-in feature, which is described on page 137.

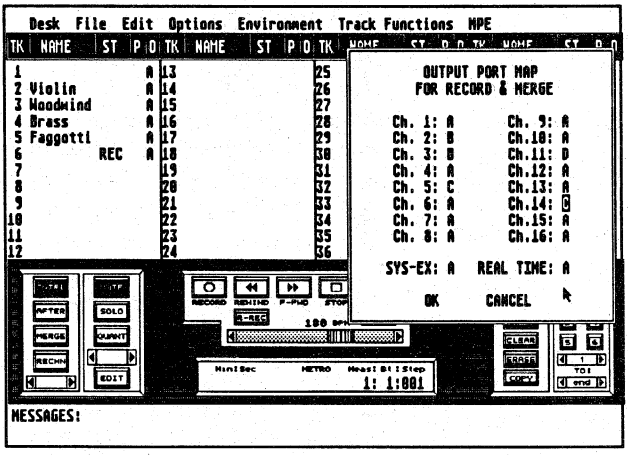
The Environment Menu (continued)

Activity Display
Step Display
Min Sec Display
SMPTE Display

These switches enable and disable various real-time display options on the two Play screens. Because each display operation takes a certain amount of time, you may find that disabling one or more displays helps improve the timing of your music in certain critical situations. See page 138 for more details.

Output Map...

The **Output Map...** option is used to determine how individual input channels are routed to MIDI output ports when muiltiple outputs are in use. Selecting this option brings up an edit window like that shown below.



Output Map

The edit window allows you to set an output port for each of the sixteen MIDI channels, as well as system exclusive and real-time messages (such as MIDI clock and song pointer).

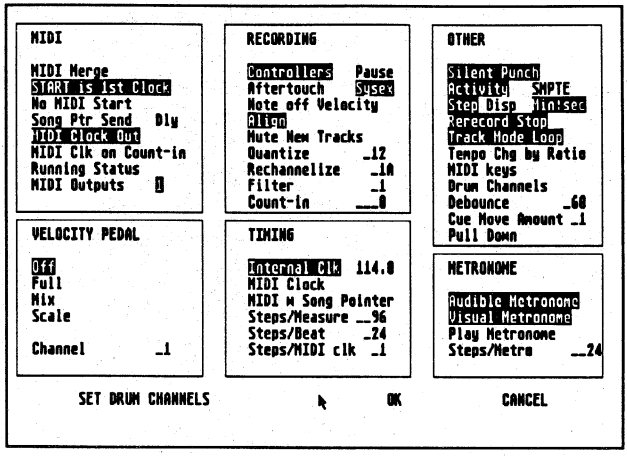
When MIDI merging is turned on, the output map determines which output will receive data from each channel. This provides a convenient way for you to determine which instruments can be played from your master controller when you change the channel setting on the master controller, or when the master controller transmits on several channels simultaneously. If you normally only play on a single channel, and wish to have easy access to all of your instruments during a recording session, we suggest that you use rechannelization instead of merging, as described on page 110.

When recording, the output map determines how the output port of a new sequence or track will be set. When the first MIDI message of a new recording is received, the KCS looks at the message's channel, compares it to the output map, and then sets the output port of the sequence or track accordingly.

The **REAL TIME** setting determines which output port will receive MIDI clock messages. Since these can only appear at one output, you must place any instruments that require MIDI synchronization (such as drum machines or external sequencers) on the same output.

It is important to note that the output map does *not* affect the MIDI output from the KCS's sequences and tracks.

The Environment Window



Environment Edit Window

The Environment window, which can be reached by clicking on **Full Environment...** in the **Environment** menu or from any Play screen by pressing the <0> (<Zero>) key, is divided into six areas, each of which contain buttons and numeric data fields for a group of related parameters. Settings for the different parameters are changed as described in the section on edit windows in Chapter 1. Most of the parameters on this screen can also be loaded from or saved to disk in a .ENV file, which is described later in this chapter.

MIDI

MIDI Merge

This switch causes the program to transmit all data received at its MIDI in to the MIDI out jack. **MIDI Merge** can be turned on and off from this screen, or with the <;> (<Semicolon>) key on any of the Play screens. You will need MIDI merge if you are using a master keyboard and remote modules.

MIDI Merge is overridden when **Rechannelize** is on. Also note that if a system exclusive message being received by the program is interrupted for some reason, the program will hang up until you leave the Play/Record screen.

START is 1ST Clock
This switch allows you to tell the program whether it should respond to a MIDI start or continue command as though it were the first MIDI clock, or simply as an instruction to start listening for MIDI clocks. If you are syncing to an external MIDI clock source, pick the setting which seems to sync better with your equipment. In particular, if you are transferring sequences from another instrument using the techniques outlined in Chapter 12 and the time of the first event recorded is always off by one clock step, you should change this setting. This option has no effect if the internal clock is being used.

No MIDI Start
This switch lets the program respond to MIDI clock even if a MIDI start command is not received. This is sometimes needed for certain specialized applications involving recording from other sequencers, and has no effect when the internal clock is selected.

Song Ptr Send
This switch activates the transmission of MIDI song pointer messages by the KCS. When this option is turned on, the program will send an appropriate song pointer message whenever a sequence or track is started from a cue point, or when a track loops to the beginning of a cue loop. The **Dly** button, to the left of **Song Ptr Send**, adds a one second delay between the MIDI Song Pointer and Continue messages after **CUE** is selected on any Play screen. This allows the external instruments to catch up to the sequencer before it starts.

When using multiple MIDI outputs, the song pointer data appears only at the output specified by the **REAL TIME** parameter in the output map, as described on page 130.

MIDI (continued)

MIDI Clock Out
This switch tells the program to enable or disable the transmission of MIDI clock. If you are not syncing a drum machine to the KCS via MIDI clock, you may want to turn this off to reduce the amount of data sent via MIDI.

When using multiple MIDI outputs, the MIDI clock signal appears only at the output specified by the **REAL TIME** parameter in the output map, as described on page 130.

MIDI Clk on Count-in
This switch tells the KCS to send MIDI clocks during the count-in, if the **MIDI Clock Out** switch is on. This should be turned off in most cases; it is provided to ensure compatibility with older versions of the KCS, which always sent MIDI clocks during the count-in.

Running Status
This switch reduces the amount of MIDI data transmitted by eliminating redundant status bytes, which can help reduce timing or other problems caused by MIDI data overload. Use with caution, especially if you are using a MIDI switch box.

MIDI Outputs
This specifies the number of MIDI outputs that are in use in your system. If you are using an unenriched ST, this should be set to **1**; if you are using the Phantom, set it to **2**, etc. The use of multiple MIDI outputs is discussed fully on page 183.

RECORDING

The options in this portion of the Environment screen are used to set certain parameters which affect recording in TRACK and OPEN modes. With the exception of **Mute New Tracks**, all recording options affect both TRACK and OPEN mode recording. Many of these options can also be changed from the record screens as well, and further information can be found in those chapters.

Controllers
Aftertouch
Note off Velocity
These switches are used to enable or disable the recording of MIDI controllers (continuous controllers, pitch bend, and program changes), aftertouch, and note-off, or release, velocity.

Pause
This switch allows you to record controller settings when the sequencer is paused. When **Pause** is on, the *last value only* of any controller that is adjusted when the sequencer is paused will be recorded. This could be used, for example, to enter a single volume control message in a previously recorded part, by playing the sequence to the point of the insertion, clicking on **PAUSE**, and then playing a few notes on the keyboard while adjusting the volume. Once you've found the proper setting, restart the sequencer by clicking on **PAUSE** again, and the final volume setting will be recorded. (Of course, the **RECORD** switch must be turned on, as well, and the sequence or track containing the newly recorded data will need to be merged with the original track or sequence, as always.)

Sysex
This switch enables the recording of system exclusive messages. When this switch is on, sysex messages of up to 5000 bytes can be recorded as single byte events. This is less memory efficient than storing sysex data in a librarian program, but it may be more convenient in some instances. The function of this switch is duplicated by the **System Exclusive** option in the TRACK Play **Options** menu.

To record longer sysex messages for use in the KCS, use the utility program DRTSYSEX.PRG, which is included with the KCS Omega package.

Align

This switch is used to force tracks or sequences to "line up" with the start of each measure, when recording or playing. If **Align** is on while you are playing sequences from the OPEN mode Play screen, sequence playback will not start as soon as the sequence key is pressed, but at the beginning of the next measure. If **Align** is on while recording in OPEN mode, recording will not stop immediately when the <F1> key is pressed, but will continue until the start of the next measure.

In TRACK mode, **Align** is used during recording to force the length of track 1 to a whole number of measures. If **Align** is off while recording track 1, recording stops as soon as the sequencer is stopped, so the last measure of the track may be less than 960 steps (or whatever the current measure length is), and the sequencer will loop unevenly. When **Align** is on, the sequencer will continue to record to the beginning of the next measure after recording is stopped. **Align** may also be turned on and off with the <Delete> key.

Since track 1 sets the length of all tracks, **Align** has no effect when recording tracks other than track 1.

Mute New Tracks

Mute New Tracks causes tracks to be muted as soon as they are recorded. This is convenient, for instance, when recording multiple takes of a long solo over a track, since earlier takes of the solo will not be played back as the sequencer loops. It is also handy when looping over a short cue, to give you a chance to play a short riff many times while you work on getting it right. This button is duplicated on the TRACK mode **Options** menu.

Quantize
This switch toggles real-time auto-correction. When **Quantize** is on, the time values and durations of all events recorded will be rounded to the nearest multiple of the number to the right of **Quantize.** Unlike auto-correction from the Edit screens, real-time quantization cannot be undone. Another difference is that all event types, including controller events and program changes, will be rounded when **Quantize** is on, whereas only note messages are affected by auto-correction.

Rechannelize
Rechannelization is similar to MIDI merging, except that all data received is rechannelized before recording or transmission to the MIDI out jack. The output channel and port are shown to the right of **Rechannelize.**

Filter
This switch forces the sequencer to only receive data on a single MIDI channel, called the filter channel. Data on all other channels is filtered out. This is especially useful when recording data from another sequencer into the KCS, or when "expanding" a single channel's data from many sequences into a single sequence using the loopback recording technique described in Chapter 12. The number to the right of **Filter** is the filter channel.

Count-in
This parameter allows you to select the number of "free" steps that you get before recording starts in real-time. The label **Count-in** is a toggle switch (which is also duplicated in the **Environment** menu), and the number to the left of this is the number of steps to wait. The metronome will sound during the count-in, but the program's clock will be held at 0 until the count is over. *Remember, this is set in steps, not metronome beats*, so to get a one measure count-in at 960 steps per measure, you must enter 960. The maximum value for **Count-in** is 9999 steps.

If the **MIDI Clk on Count-in** switch is turned on, MIDI clocks will be sent during the count-in. Normally, this switch should be turned off.

OTHER

Silent Punch
This switch only affects the operation of the sequencer in TRACK mode. When **Silent Punch** is on, notes that are being punched out will be muted while punch points are being set. Once the punch points are set, the punched portion of the track will be muted regardless of the setting of this switch. **Silent Punch** also affects notes that are deleted when **LIVE EDIT** is active--if **Silent Punch** is off, notes that are being deleted will still sound when **LIVE EDIT** is on.

Activity
The **Activity** switch enables the musical icons which appear next to active tracks in the track status display. You might want to turn the activity display off when recording or playing very dense musical passages, or when using high clock resolutions. This button is duplicated by the **Activity Display** switch on the **Environment** menu.

SMPTE enables the SMPTE display that appears when using the Phantom in conjunction with the KCS. As with the other display options, turning the SMPTE display off may improve the program's timing in certain critical applications. This button is duplicated by the **SMPTE Display** switch on the **Environment** menu.

Step
The **Step** switch enables the step portion of the measure/beat/step counter. Turning the step display off reduces the computer's work load slightly, and allows the program to concentrate on more important tasks. This button is duplicated on the **Environment** menu.

Min:sec
This switch enables the play timer, which displays the amount of time elapsed since the sequencer was started. As with the other display switches, turning this switch off may help in hypercritical timing applications. See Chapter 12 for details on the play timer. This button is duplicated on the **Environment** menu.

Rerecord Stop
This switch affects the operation of the <Clr/Home> key and **R-REC** button in TRACK mode only. When this switch is highlighted, pressing <Clr/Home> will erase the current recording, stop the clock, and reset the measure/beat/step counter. When **Rerecord Stop** is off, pressing <Clr/Home> will erase the current recording, but the sequencer will continue to play.

Track Mode Loop
This switch, surprisingly enough, controls looping in TRACK mode. When this switch is off, all tracks will play through only once. It is also possible to play or record past the end of track 1 (which normally sets the loop point for TRACK mode) by turning **Track Mode Loop** off. You should be careful about recording on tracks other than track 1 when **Track Mode Loop** is turned off, since any data recorded past the end of track 1 will be lost when a **Double, Append,** or **All Tracks to Seq** operation is performed, unless the length of track 1 is extended by changing the **TIME** value of track 1's final DE event. This switch is also found in the TRACK mode Play screen's **Options** menu, under the name **Auto Loop.**

Tempo Chg by Ratio
This switch changes the amount of tempo change which occurs when tempo is changed from the TRACK mode control panel, or from the computer keyboard. When this switch is off, the tempo will change by 1 BPM when any of the tempo controls is pressed; when this switch is on, the tempo will change by about 2.5% for each button press. This switch is also duplicated in the TRACK mode **Options** menu.

MIDI Keys
This switch is a convenience feature for advanced KCS users, that allows controlling certain sequencer functions from an external MIDI footswitch controller. When this switch is on, MIDI controllers 64, 65, and 66 (the sustain, portamento, and sustenuto pedals, respectively) duplicate the functions of certain keys on the computer's keyboard on the program's TRACK mode, OPEN mode, and step-time record screens. The sustain pedal duplicates the <F10> key combination on both screens, but is especially useful in TRACK mode, since this allows you to start recording and set the track loop point with no hands. In TRACK mode, the portamento pedal is equivalent to the **R-REC** button, and the sustenuto pedal controls the **STOP** button. In OPEN mode, the portamento and sustenuto pedals are used to start real-time recording, and duplicate the functions of the <Return> (record on next event) and <Enter> (record immediate) keys, respectively. On the step-time record screen, the portamento pedal inserts a rest, and the sustenuto pedal deletes the previous note. These controllers are recognized on all MIDI channels, and are not merged or recorded when **MIDI Keys** is active.

Drum Channels
This parameter is used to mark one or more channels as "drum channels". This option protects the designated channels from any pitch transpositions that occur in a control sequence, or when editing a sequence or track. Since drum machines (as well as synthesizers and samplers that contain drum sounds) assign each drum to specific MIDI notes, transposing a drum part will cause the wrong drums to be played by the sequencer; hence the need for drum channels.

To specify one or more drum channels, click on **SET DRUM CHANNELS** at the bottom of the Environment screen. An edit window which contains a list of channels and output ports will appear, any of which may be marked as a drum channel.

Cue Move Amount
This sets the amount that the cue point(s) will move when the cue move buttons are pressed. This will toggle between one and eight measures when the <Alternate> key is pressed on any Play screen, but can be set to any value from 1 to 99 on the **Environment** screen.

The **Pull Down** switch converts the program's drop down menus to pull down menus, just like those used by programs on that computer with the picture of a piece of fruit on the case. In this mode, you must left click on a menu name in order to see the menu. This is especially useful when recording or performing, since the sequencer stops any time a menu comes down. We suggest that you leave this switch on, once you've discovered it.

VELOCITY PEDAL

The switches in the **VELOCITY PEDAL** section are used to choose one of the three velocity pedal options, as well as the velocity pedal channel, which are used to affect note velocities during OPEN or TRACK mode recording, or when **LIVE EDIT** is active in TRACK mode. Velocity pedal in OPEN mode can only be selected from this screen. See page 99 for details on velocity pedal functions.

TIMING

The parameters in the **TIMING** section of the **Environment** window are used to select the clock source and set the timing resolution of the sequencer. Chapter 12 has more information on timing resolution. Remember that the internal clock is always used when playing a sequence or track from the Edit screen, so the setting of the clock source selector switches will have no effect when working on the Edit screen.

Internal Clk
This switch selects the program's internal timer as the clock source. The number to the right of this switch is the tempo, in beats per minute. The tenths of BPM digit is treated as a separate field by the program, which means you will need to use the mouse to place the cursor on this digit. This button is duplicated on the **Environment** menu.

MIDI Clock
MIDI Clock selects an external MIDI clock as the clock source. The sequencer will wait for a MIDI start or continue message before starting any tracks or sequences, unless the **No MIDI Start** button is turned on. This button is duplicated on the **Environment** menu.

MIDI w Song Pointer
This switch selects the external MIDI clock source and enables the reception of MIDI song pointer messages. When a song pointer message is received, the sequencer will move to that point in the current cue sequence or track, and play from that point. This button is duplicated by the **Song Pointer** button on the **Environment** menu.

Steps/Measure
This sets the number of steps in a measure, which only affects the measure/beat/step counter on the play and Edit screens, and the event list on the Edit screen. This value will change whenever an SM event is encountered in a sequence or track. The following table shows the correct **Steps/Measure** setting for the most common time signatures and **Steps/Beat** values.

Time Signature	Steps/Beat 24	96	240
3/8	36	144	360
2/4	48	192	480
5/8	60	240	600
3/4	72	288	720
6/8	72	288	720
7/8	84	336	840
4/4	96	384	960
9/8	108	432	1080
5/4	120	480	1200
6/4	144	576	1440
7/4	168	672	1680

Steps/Beat
This sets the overall timing resolution of the sequencer. (This is also referred to a "pulses per quarter note", or PPQN, in other sequencers.) The MIDI standard value for **Steps/Beat** is 24. Higher values allow for more precise timing, but may also make editing more difficult and put a greater strain on the computer, by giving it less time between steps in which to do its "housekeeping" chores. We recommend a **Steps/Beat** setting between 96 and 240.

If **Steps/Beat** is changed during an Environment session, the program will ask if you want to "Adjust all event times?" when you leave the Environment screen. Answering **Yes** to this question will compress or expand all event times and durations to match the new resolution. The program will also ask if you wish to adjust the related parameters. A **Yes** answer here will change the **Steps/Measure**, **Steps/MIDI clk**, and **Steps/Metro** settings proportionally, or **No** will leave the settings unchanged.

Steps/MIDI clk
This sets the number of sequencer steps between each MIDI clock. This should normally be set to 1 when **Steps/Beat** is 24, and adjusted proportionally when **Steps/Beat** is increased. The sequencer uses the current tempo setting to interpolate between MIDI clocks when an external MIDI clock is used and **Steps/Beat** is greater than 24, so there will be an improvement in resolution when **Steps/Beat** and **Steps/MIDI clk** are increased, even if an external clock is in use.

METRO-NOME

Steps/Metro
This sets the interval between metronome ticks. The default is for the metronome to occur every 240 steps. If you want the metronome more or less often, or you change the **Steps/Beat** setting, you will want to change the number of steps per metronome.

Audible Metronome
Visual Metronome
These switches enable or disable the metronome click that is produced by the monitor speaker, and the musical icon metronome that is shown on the TRACK mode and OPEN mode Play/Record screens. Both are duplicated on the **Environment** menu.

Play Metronome
This switch turns the metronome on when the sequencer is in play. If this switch is off, the metronome will only occur when the program is recording.

Environment Files

Most of the parameters shown on the Environment screen can be saved in an environment file. This allows you to quickly and accurately change the recording and playback parameters when you move to a new recording situation. Environment files have a .ENV extension.

Environment files contain the values for time, duration, and velocity used on the Step-time record screen, as well as the screen colors and the following Environment parameters. All the parameters from the **MIDI** and **METRONOME** sections of the Environment screen (except the **DLY** switch) are saved, and in the **TIMING** section, all parameters are saved. In the **RECORDING** section, the **Controllers**, **Aftertouch**, and **Note off Velocity** record switches are saved, as well as the **Rechannelize** status and channel. In the **OTHER** section, all parameters except **Track Mode Loop**, **MIDI Keys**, and the **Cue Move Amount** are saved, and in the **VELOCITY PEDAL** section, only the **Channel** is saved.

If an environment file named DEFAULT.ENV exists on the KCS program disk, it will be automatically loaded when the program boots up. The environment is also saved as part of each .ALL file.

If the **Steps/Beat** setting in the environment file is different than the current setting when you are loading a .ENV file, the program will ask if you want to adjust all event times. See the chapter on the **File** menu for more information on .ENV files.

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Chapter 10

Multi Program Environment and QuickScore

If your Atari ST has a meg or more of memory, you can use Dr. T's exclusive Multi Program Environment (MPE) to load up to eight other MPE programs into memory at once. These programs allow you to extend the Keyboard Controlled Sequencer's capabilities to those of a dedicated music workstation, combining sequencing, sound design and management, scoring, algorithmic composition, and many other functions in one integrated system.

Note that MPE modules use memory that would otherwise be used for event storage, so there are some tradeoffs involved in loading multiple programs, especially on one meg systems. This chapter covers the basics of using the MPE, and also discusses memory considerations and other tidbits pertinent to the Multi Program Environment, as well as the operation of QuickScore, a high-speed scoring utility included with this version of the KCS.

Loading MPE Programs

The MPE can be accessed with the eight **MPE** buttons on the Edit screens, or through the **MPE** menu on the TRACK mode Play/Record screen. On the Edit screens, clicking on **New** will load and run a new MPE program. In the **MPE** menu, the **Load...** button does the same thing. A GEM file selection window will appear, where you must select a .INF file for the program to be loaded. This file contains information about the program to be loaded. If there is enough memory available to load the new program, it will be loaded and run.

NOTE

Note that only programs designed *specifically* for the MPE will have valid .INF files. The MPE will not load the files DESKTOP.INF or KCS.INF!

Loading MPE Programs (continued)

After the MPE program is loaded, a three letter abbreviation for it (**Tun** for Tunesmith, for example) will appear in the next free slot in the **MPE** buttons and menu. Clicking here will take you back to the MPE program. The MPE program itself will have some option, usually labeled **To KCS** or **KCS Edit**, for returning to the KCS.

MPE programs may be loaded from any directory on a hard drive, though you will usually have to insert the original disk in drive A when you first load the program. (The MPE programs supplied with the KCS Omega package do not have this requirement.) Most MPE programs require that their default, configuration, and resource files be either in the folder containing the MPE program, or on the A drive. To be safe, you should save these in both places.

Deleting MPE Modules

The most recently loaded MPE module can be removed from the ST's memory in one of two ways. The MPE menu contains an option for removing the most recently loaded program, or you may delete the program by holding down either <Shift> key when selecting that program in the **MPE** buttons on the Edit screens. This frees up the memory used by the program and returns it to the sequencer. It also deletes any data used by the MPE program, so be sure to save your work in the MPE program before deleting it.

Note that, since MPE programs must be deleted in the opposite order from which they were loaded, you may want to do a little planning if you plan on running several MPE modules. The programs that you will be using throughout your session should always be loaded first, even if you won't be using them immediately, and you should save the programs that are only used occasionally for last. Of course, you could always delete the first program loaded by removing all of the programs, deleting the first, and then re-loading the others, but this is no fun at all, and is best avoided.

Memory and the MPE

Before you become all excited about running nine programs simultaneously on your stock 1040 ST, we must point out that the number of programs you can run in the MPE will depend, of course, on the amount of memory your system has, as well as the presence of desk accessories and/or memory resident programs, and the sizes of the MPE modules themselves.

Generally speaking, a 1040 can run one or two MPE modules, and a Mega 4 can handle a full complement of eight programs, assuming they are not all memory hogs. In order to run the Copyist (our notation program) or Tiger in the MPE, two megs of RAM are recommended.

The file KCS.INF, described in the next section, also affects the amount of memory available for sequence storage.

KCS.INF

The file KCS.INF is used to store certain types of startup information for the program. This file tells the KCS which MPE modules to load when it starts, and how much GEM resource space to allocate to the MPE programs.

KCS.INF is a standard ASCII text file, which means that you can edit it with any word processor that saves in ASCII (unformatted) format. The first line of KCS.INF contains the number of Kbytes that should be reserved for GEM resource storage, while the remaining lines list the MPE programs that are to be loaded when the KCS starts. A typical KCS.INF file is shown below.

```
60
C:\SONGEDIT\SONGEDIT.INF
PHSMPTE.INF
\TIGER\TIGER.INF
D:\TUNESMIT\TUNSMITH.INF
```

KCS.INF (continued)

This file allocates 60 Kbytes for storing GEM resource files, and loads four MPE modules. The list of MPE programs must also contain the paths for each program, and follows the usual rules for TOS path names. (For instance, in this example, the file PHSMPTE.INF must be in the same directory as the KCS, and TIGER.INF is assumed to be on the same drive as the KCS.) If you're not sure of these rules, we recommend that you use the full path for each file.

NOTE

While the MPE programs supplied with the Omega package will all load "invisibly" when they are listed in KCS.INF, older MPE programs (such as Fingers) may not automatically return to the KSC when autoloading, thereby interrupting the autoload process. To get around this, all you need to do is leave the offending MPE program (by clicking on **QUIT** or **Exit**), and the KCS boot process will continue in the usual fashion.

The amount of space allocated to GEM resource storage will depend on both the types of programs you plan to load, and the amount of memory in your system. As a general rule of thumb, you should allocate twice as much space as is used in each of the resource files for the programs you might wish to load in a session. (This can be determined by clicking on the resource file icon, then selecting **Show Info...** from the Desktop **File** menu.) For example, to run the *Copyist* (.RSC file size = 30 Kbytes) along with the M1 Editor (4 Kbytes), KCS.INF should allocate (2*(30+4)), or 68, Kbytes. If this value is too small, MPE programs may have problems loading resource files, or it may be impossible to load programs after deleting others. The manual for each MPE application will discuss that program's special requirements, if any.

The KCS also gives you the option of loading any of several different versions of KCS.INF when you run the program, by holding down a key while the program boots. The following table shows the names of the .INF files that will be loaded when specific keys are held down.

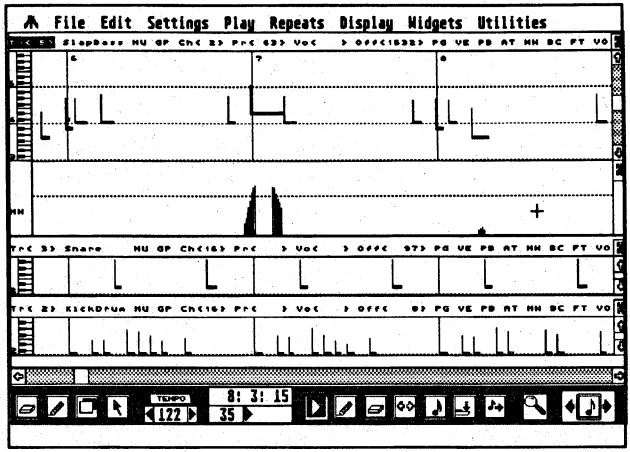
No key	KCS.INF
<Alternate>	KCSALT.INF
<Shift>	KCSSHIFT.INF
<Control>	KCSCTRL.INF

Using MPE Programs

The details of each MPE module's interaction with the KCS will depend on its function. Some make little use of the KCS, while others are thoroughly enmeshed in it. Some programs, in particular Fingers, may overwrite one or more sequences when they are used. Check the manual for each program for this type of thing before loading the program, in order to prevent accidental and unsightly loss of data. Some programs may have a way for you to play sequences, ranges, or cues, and others may allow you to temporarily jump to the KCS's current Play screen, without leaving the MPE module.

MPE Applications

The KCS Omega package includes several MPE modules, which are described in separate manuals. These include Tiger (an advanced graphics sequence editor), Song Editor (a graphics song editor), the Phantom (a SMPTE synchronization tool), and QuickScore (a high-speed transcription and printing module). We have also included a program called ANY_PROG.MPE, which lets many programs that are not MPE-compatible be executed from within the KCS. This is described in an accompanying README file.



Tiger in the MPE

Other MPE programs are available for just about any application you can imagine. The Caged Artist series of synthesizer and effects editors currently supports over 35 different instruments (not counting rack versions) with dedicated editor/librarians, and XOR, our universal editor/librarian, can be used with any instrument you own. If you're interested in having the computer generate or transform musical ideas for you, you should check out Tunesmith and Fingers. The Copyist provides complete transcription and score editing capabilities, along with professional quality laser and PostScript output. And for those who want to explore computer music at its most intimate level, we offer T-BASIC, a full-featured, high speed variant of the BASIC programming language, that provides direct access to all of the important KCS data storage areas and play routines!

Scoring with QuickScore

QuickScore is an MPE program that is designed to create traditional musical representations of tracks recorded in the KCS. It is actually a simplified version of the Copyist, our highly regarded professional scoring program. With QuickScore, you will be able to

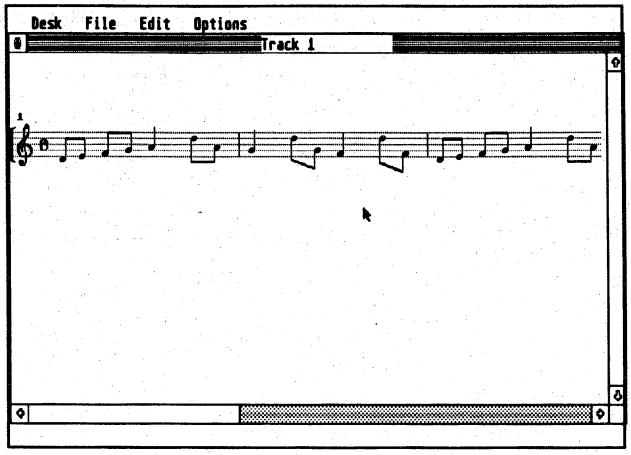
* View your music on the ST's monitor in standard musical notation.

* Print complete scores (or single tracks) of the songs you've recorded, for other musicians to play.

Starting QuickScore

QuickScore is loaded like any other MPE module, as described earlier in this chapter. The program and its .INF file are located on the QuickScore disk provided with the KCS. After inserting this disk in drive A, pull down the **MPE** menu, then left click on **Load.** When the file selector appears, select the file QUICKSCR.INF, and the MPE will load and execute QuickScore.

When you enter QuickScore, it will automatically start transcribing the music in the first sixteen recorded tracks. The first time you enter the program, it will transcribe everything using its default display settings. (You'll learn how to change the display settings a little later in this chapter.) The mouse cursor will disappear for a little while as QuickScore transcribes the music, after which the screen will look something like this:



QuickScore

Depending on the contents of your song, the initial output from QuickScore may be just what you are looking for. However, it's more likely that at least a few areas of the transcribed music won't look just the way you'd like them to. For this reason, QuickScore has several menu items that let you massage the notated music slightly. In the next section, we'll look briefly at all of the items in QuickScore's menus, and then see how they are used to transfer your song to paper.

QuickScore's Menus

QuickScore's three menus contain several items for changing the appearance of your music, for viewing different sections, for playing the music you're looking at, and for printing the music.

The File Menu

Save Display

This item is used to save the contents of QuickScore's **Display...** edit window, which is described later in this section. The display file contains all of the information that determines how your song will look when it is printed. The file is saved with a .DIS extension, using the same file name as the last .ALL file saved in the KCS. QuickScore loads a new .DIS file whenever it sees that the file name used in the KCS has changed.

Print File

This prints the song. If QuickScore's display only shows a single track, then only that track will be printed; otherwise, the full score is printed. You may press the <Esc> key at any time to cancel printing.

Print Line

This prints the music that is displayed on the screen. If **Single Track** is selected, then only the visible portion of the selected track will be printed. If **Full Score** is selected, all tracks will be printed, including any that may not be visible on the screen.

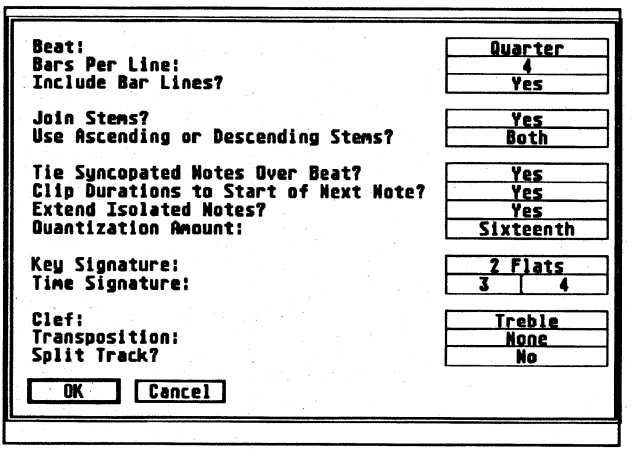
Exit

This takes you back to the KCS. As with any other MPE program, the data in QuickScore is not disturbed by this operation, and you may return to QuickScore by selecting **QSc** from the MPE box or menu.

The Edit Menu

Display...

This menu item is the only part of QuickScore that is the least bit complicated. It is used to determine how the music will be displayed. After you select **Display...**, the following edit window will appear.



The Display Window

All of the items in this window, except the first three and the **Key Signature** and **Time Signature**, affect only the track that is currently displayed. If the full score is being displayed, then changing any parameter will change that parameter for every track. The **Clef**, **Transposition**, and **Split Track?** items are only available if you have selected **Single Track** in the **Options** menu.

The **Beat** setting lets you specify the basic beat value for your music. This should almost always be left at its default setting of **Quarter**. Other values may be needed if you have specified an unusual **Steps/Measure** setting in the KCS. If the **Beat** value you have specified is not appropriate for the time signature you've chosen, an error message will occur.

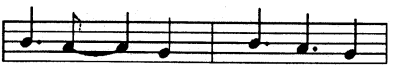
Bars Per Line lets you determine how many measures will be printed on each line. Generally speaking, this should be set to something between 2 and 4.

Include Bar Lines? allows you to eliminate the bar lines in the display. This should almost always be set to **Yes**.

If the answer to **Join Stems?** is **No**, then each note will be printed with its own individual flag, a method which is occasionally used for scoring vocal melodies, especially in church music. If the answer to this question is **Yes** (the usual answer), beams will be used to join the stems of the notes.

Use Ascending or Descending Stems? lets you determine whether the music will be transcribed with stems that go up from the note head (**Ascending**), stems that go down from the note head (**Descending**), or a combination of the two (**Both**). Unless you have a particular reason for setting the direction of the stems, this should be set to **Both**.

The following diagram illustrates the difference between a **Yes** and **No** answer to **Tie syncopated notes over beat?** If the answer is **Yes**, notes that start off the beat and extend over a beat boundary will be broken into two tied notes. The choice is strictly a matter of personal preference.



The next two questions affect the way durations are transcribed. **Clip Durations to Start of Next Note?** is especially handy for legato monophonic parts, as it corrects the transcription problems that occur if a note hangs on past the start of the next note, a very common occurrence. Set this to **Yes** for monophonic parts, or **No** for polyphonic instruments. **Extend Isolated Notes?** is used to extend staccato notes to the next note or beat boundary. As an example of the type of problem this prevents, suppose that you've recorded a sequence of short, clipped eighth notes, interspersed with the occasional sixteenth note. If the **Quantization Amount** (described in the next paragraph) is set to sixteenth notes, the eighth notes will appear as sixteenth notes followed by sixteenth rests. If **Extend Isolated Notes?** is set to **Yes**, these notes will be transcribed properly. Isolated notes are extended to the start of the next note, or to the start of the next beat, whichever comes first.

Quantization Amount sets the minimum note value that will appear in the display, and aligns the notes to the specified value. For most music, this should be set to **Sixteenth** or **Eighth**. If this is set to **None**, the minimum note size will be a sixty-fourth note, and, more importantly, notes will not be quantized to the nearest "reasonable" value. **None** is handy if you have quantized your music within the KCS, and wish to print music that is quantized to some value that is not available here--for example, to triplets. Please note that, if you have *not* quantized within the KCS, the use of **None** will probably result in very messy looking music. You should also be aware that QuickScore will not add the "3" and associated grouping symbol above any triplets; you'll have to do this by hand (with a pencil) if you wish to transcribe triplets.

As you may have guessed, **Key Signature** lets you set the key signature to be used for the transcription, and **Time Signature** does the same for the time signature. The numerator and denominator of the time signature are entered separately. The time signature used by QuickScore will default to the time signature corresponding to the current **Steps/Measure** setting in the KCS, though you can change it here if you wish. (Time signature changes in QuickScore are NOT reflected in the KCS.)

The **Clef, Transposition,** and **Split Track?** options affect the way that pitches are written for each track. They are only available if a single track is being displayed. The clef is the symbol at the beginning of each staff that tells the musician what pitch range the instrument plays in. The default (and the clef which is used for most instruments) is **Treble. Bass** is obviously used for bass instruments, while **Alto** is used less frequently for instruments such as the viola. The **Drum** clef is used for drum and percussion parts, and also tells QuickScore to use a special set of symbols and staff positions that denote certain percussion instruments. These symbols, and the MIDI note numbers and drums they are assigned to, are shown on page 172. If you wish to use QuickScore to print drum parts, be sure your drum assignments match these.

Transposition is used to match any transpositions that are traditionally used in notating certain instruments. For example, in most trumpet parts, the note that is written as C in a trumpet part is actually B flat, and would be transcribed that way by QuickScore. In order for such a part to be in tune when played by a trumpet player, the part must be transposed up two semitones before printing. This transposition does not affect the musical data in the KCS. For more information on the appropriate clefs and transpositions to use with specific instruments, see any book on the instruments of the orchestra.

If **Split Track?** is set to **Yes,** QuickScore will display the track on a grand staff. A grand staff is a pair of staves joined by a bracket, one using a treble clef and the other a bass clef. This type of staff is used by the piano and other keyboard instruments, as well as the harp. The **Clef** selection is ignored if a grand staff is used.

Full Score
This option tells QuickScore to display every track in your song. When **Full Score** is selected, changing any setting in the **Display...** window will change that setting for all 16 tracks.

Single Track
This option tells QuickScore to display a single track. After you left click here, a small edit window will allow you to select a track. When **Single Track** is selected, most of the options in the **Display...** edit window will affect only that track. *Note that the numbers given here are not the actual track numbers, but the order number of any tracks that contain music.* For example, if you have music in tracks 2, 3, and 5, with track 1 containing tempo information and all other empty, these tracks would be numbered 1, 2, and 3 in this window.

Play Screen
This option will play the music that is shown on the screen. You may also play the music on the screen at any time by pressing the <Space bar>.

Jump to Bar...
This lets you change the first measure (bar) that is shown in the screen display.

Choose Printer...
This option tells QuickScore what type of printer you are using. QuickScore can print on two different types of 9-pin dot-matrix printers, NEC-compatible 24-pin dot matrix printers, the Atari SLM804 Laser printer, and HP DeskJet, LaserJet+, and LaserJet Series II printers. For most 9-pin dot-matrix printers, you should select the **Epson** variant initially, and try the **HP Inkjet** setting if this gives you problems. If you have problems printing on a 24-pin printer, you might want to try one of the 9-pin settings, since many 24-pin printers have a 9-pin emulation mode. If you are using the Atari laser printer, you must run the Diablo 630 emulation program (included with the printer) before starting the KCS and QuickScore.

You may save your printer choice to a disk file by left clicking on **Save**. QuickScore will then automatically work with your printer in future sessions.

Moving Within the Score

In addition to the **Jump to Bar...** option discussed earlier, QuickScore allows you to use the scroll bars and certain keys to move within your score. The vertical scroll bar lets you view additional tracks when in **Full Score** mode, and the horizontal scroll bar lets you look at different measures, much as **Jump to Bar...** does. In addition, the following keys can be used to move within the score:

<Cursor Right>	Ahead one screen
<Cursor Left>	Back one screen
<Cursor Up>	Scroll up
<Cursor Down>	Scroll down
<Clr/Home>	Beginning of song

A Typical QuickScore Session

Displaying your music in traditional notation with QuickScore is simple: all you have to do is start QuickScore, and the track you're viewing will be transcribed instantly. However, if you want a full printout of a song you've done, then you'll need to spend a little time working with both the sequence data and QuickScore's Display window, in order to get the best possible results.

A Typical QuickScore Session (continued)

For this discussion, let's assume that you've completed your latest concerto, and that you'd like to print it out. After saving it (preferably in a couple of places--you DON'T want to accidentally replace your disk file with the version you're playing with), the first step is to move all of your music into a maximum of 16 tracks, and to rearrange your tracks in the order you wish to have them scored. As a general rule, the bass and drum parts should go at the bottom (in the higher-numbered tracks), with the lead instruments at the top. (There are no real rules for scoring rock bands or electronic pieces, but if you're doing something using traditional acoustic sounds, any book on orchestration should give you some idea of how to lay out such scores.) You should also make sure that there are no unused tracks between your recorded tracks, as these can cause QuickScore to become confused.

The next step is to use QuickScore's Display window to set the parameters for each track. In particular, you'll have to select the proper clef for each track, since the default clef (treble) is not going to be appropriate for some tracks. For piano parts, don't worry about the clef; instead, answer **Yes** to **Split Tracks?** Remember that if you are scoring a percussion part, your drum note assignments *must* match those used by QuickScore, as shown on page 172. (If they don't, you will need to edit the drum track(s) so that the proper notes are used for each drum. This won't sound right when played back on your system, but it will transcribe properly.) You may also want to adjust the **Quantization Amount** and set the answer to the **Extend** and **Clip** questions based on the contents of each track, as described earlier. You don't need to explicitly set the **Time Signature**, since QuickScore can get that from the KCS, but you will need to set the **Key Signature**.

Once you've set all of the display parameters, you should use **Save Display** to save them in a disk file. (That way, if you decide to use QuickScore with this song at a later time, you won't need to re-enter all of the settings.) Now you can print the song using the **Print File** option, but before you do, it's a good idea to quickly look at different sections of the piece (especially the more complex sections) to make sure everything looks the way you want. If they don't, tweak the Display window parameters and/or sequence data until things look right, then print the score.

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Chapter 11

MIDI

While it is possible to make good use of the Keyboard Controlled Sequencer without detailed knowledge of MIDI, you will undoubtedly find that as you start to realize some of the enormous potential inherent in most MIDI instruments, an understanding of the nuts and bolts of MIDI can be very helpful. This chapter contains information on a number of subjects pertinent to the KCS, but is by no means a complete guide to MIDI. Fortunately, a number of well written books on the subject have appeared on the market; we recommend tracking one down if you need more detailed information.

MIDI Connections

A MIDI cord consists of a twisted and shielded pair of wires, with the body of the plug isolated from the shield. At the MIDI out jack, the MIDI cable plugs directly into the synth or computer's circuitry; but at the MIDI in of the receiving instrument, the cable connects to an "opto isolator", which uses light, rather than electrons, to couple the signal into the instrument. This means that there is no electrical conductor between the MIDI in of one machine and the MIDI out of another, so you can't blow something by incorrect patching.

Although MIDI cables look the same as standard DIN or Roland sync cables, the grounding of the two cables is different. DIN cables can create "ground loops", which will cause hum and other nasty sounds to appear at the output of your synthesizer(s).

As mentioned in the first chapter of this manual, the Atari ST uses a non-standard method for creating a MIDI thru connection with its MIDI out jack. This causes a conflict with some types of (also non-standard) MIDI cables which have the two normally unused pins (1 and 3) shorted to the pins which carry MIDI data (4 and 5). The best solution to this situation is to have the ST permanently modified to meet the MIDI spec; a less drastic solution is to check your cables with an ohm meter, preferably before leaving the store with them.

MIDI Modes

MIDI modes determine how an instrument will respond to incoming MIDI data. MIDI modes can be a source of confusion to beginners and pro's alike, primarily because one MIDI manufacturer misinterpreted the meaning of one of the modes when they introduced their first MIDI synthesizer. The three original modes were broken into four modes to allow for this. Since then, other manufacturers have created new modes to take advantage of various types of multi-timbral implementations. The original four MIDI modes can be selected on any synth that implements them through a control change (CC) event called a *mode message*; any other modes must be selected at the instrument or with a sysex message. The section on **Some Useful MIDI Commands** on page 168 gives an example of how to select one of the four standard modes from the KCS.

The four standard modes are called Omni On/Poly, Omni On/Mono, Omni Off/Poly, and Omni Off/Mono; they are also known as modes 1--4, respectively. The two Omni On modes cause the synth to receive data on all 16 MIDI channels at once; this is good for keyboards that are connected together in a layering arrangement, but not so hot for sequencing applications. Many earlier synths and drum machines power up in mode 1 (Omni On/Poly), and must be changed to one of the other modes to be used in a multi-instrument sequencing environment. Mode 2 (Omni On/Mono) is virtually useless in all situations, as it causes an instrument to play only one voice monophonically, from all MIDI channels. This is the extra mode that was accidentally created in the early days of MIDI.

The two Omni Off modes, modes 3 and 4, are more useful in a sequencing environment. Mode 3 (Omni Off/Poly) causes a synth to play all its voices polyphonically on one MIDI channel, while Mode 4 (Omni Off/Mono) puts each voice on a separate MIDI channel for monophonic operation. The Casio CZ-101 and SCI Sixtrak both use Mode 4 to implement their multi-timbral features, while more advanced synths like the Oberheim Xpander, Ensoniq ESQ1, E-mu Proteus, and Yamaha FB01 use non-standard MIDI modes to allow assigning some voices to one channel, and some to others.

Other MIDI Messages

Some synthesizers can be placed in an operating condition called *local control off.* In this mode, they will respond only to signals coming in via MIDI, while ignoring their keyboards. They will continue to send keyboard information via MIDI OUT. *Local control on* will return the synth to normal operation. Local control messages are a subset of the continuous controllers, and are sent from the sequencer with CC events.

Other MIDI Messages (continued)

System real-time messages are used to synchronize MIDI instruments in real-time. The *timing clock* message will advance drum machines and sequencers to move in time with the sequencer. Other system real-time messages include the *start*, *stop* and *continue* commands. Normally, these events are sent by the KCS at the appropriate times, but they can be sent as single byte messages for specialized applications. Other less useful real-time messages include the *reset* and *active sense* messages.

System common messages are miscellaneous messages which can be sent to instruments, regardless of what channel they are on. These include the *song select* command, the *tune* command (which initiates oscillator tuning on analog synthesizers), and the much ballyhooed *song position pointer* message.

System exclusive (sysex) messages are used by individual manufacturers to do whatever they want to do with their instruments that is not covered in the normal MIDI spec. This includes, but is not limited to, functions such as patch dumps, remote button pushing, and even displaying messages on an instrument's display. You can use single byte events to send sysex information, but it is your responsibility to determine the response of your instruments to the information sent. The March 1987 issue of Electronic Musician has an article on using system exclusive data with the KCS.

Some Useful MIDI Commands

All of the message types described above can be sent from the KCS, either as CC events, or with single byte messages. While many earlier synthesizers have their own controller assignments, the assignments of all MIDI controllers are now standardized by the MIDI Manufacturers Association, and are listed on the next page.

Controller Name	Number	Range
Modulation Wheel	1	0--127
Breath Controller	2	0--127
Early DX7 Aftertouch	3	0--127
Foot Controller	4	0--127
Portamento Time	5	0--127
Data Slider	6	0--127
Main Volume	7	0--127
Balance	8	0--127
Pan	10	0--127
Expression	11	0--127
General Purpose #1	16	0--127
General Purpose #2	17	0--127
General Purpose #3	18	0--127
General Purpose #4	19	0--127
LSB's for #'s 0--31	32--63	0--127
Sustain Pedal	64	0 or 127
Portamento On/Off	65	0 or 127
Sustenuto Pedal	66	0 or 127
Soft Pedal	67	0 or 127
Hold 2	69	0 or 127
General Purpose #5	80	0 or 127
General Purpose #6	81	0 or 127
General Purpose #7	82	0 or 127
General Purpose #8	83	0 or 127
Tremolo Depth	92	0--127
Chorus Depth	93	0--127
Celeste Depth	94	0--127
Phase Depth	95	0--127
Data Increment	96	0 or 127
Data Decrement	97	0 or 127
Non Reg. Parameter MSB	98	0--127
Non Reg. Parameter LSB	99	0--127
Reg. Parameter MSB	100	0--127
Reg. Parameter LSB	101	0--127
Local Control On/Off	122	0 or 127
All Notes Off	123	0
Omni Off	124	0
Omni On	125	0
Mono On (0 = Omni Off)	126	0--16
Poly On	127	0

Some Useful MIDI Commands (continued)

Many instruments also have assignable controls, which can be set to send or recognize any MIDI controller. This allows you to use any of the unassigned or less common controllers for whatever purpose you'd like. Examples of such instruments are the Oberheim Xpander, Matrix 12, and Xk keyboard, the E-mu Proteus, the Yamaha KX76 and KX88 keyboard controllers, the Kurzweil MIDIBoard, and JL Cooper's FaderMaster, which provides eight separate sliders that do nothing but transmit MIDI data.

As an example of how these might be used, here is a sequence that sets a CZ-101 on Channel 5 to MIDI mode 4 (Omni Off/Mono), and then turns local control off on channels 6 and 7:

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0	5	CC	126	0	
1-	1:	1	2	0	6	CC	122	0	
1-	1:	1	3	0	7	CC	122	0	

The other three modes require two mode change messages to select a particular mode, for instance, control changes on controllers 124 and 127 to select Omni Off/Poly On.

The numbers to be entered in single byte events for the other message types are given below:

Message Name	1st Byte	2nd Byte	3rd Byte
Sysex Start	240	ID #	
Song Pointer	242	LSB	MSB
Song Select	243	Song #	
Tune Request	246		
Sysex End	247		
Timing Clock	248		
Start	250		
Continue	251		
Stop	252		
Active Sense	254		
System Reset	255		

The values used for the second and third bytes in the first three messages must be in the range of 0--127. If you are using the song select message to select a song on an external drum machine or sequencer, you'll need to send a stop message just before the song select message, and a start message immediately thereafter. The form of system exclusive messages varies from one instrument to another; consult your manual for details.

Program Changes

The program numbers assigned to MIDI program change numbers can vary quite a bit from one manufacturer to the next. Generally speaking, sending a program change to a Sequential or Oberheim synthesizer will cause that patch number to be selected, while sending the same program change to a Yamaha or Ensoniq instrument will select that patch number minus one. Some older Korg and Roland instruments use a "bank system" in which programs are selected via a modified octal numbering system.

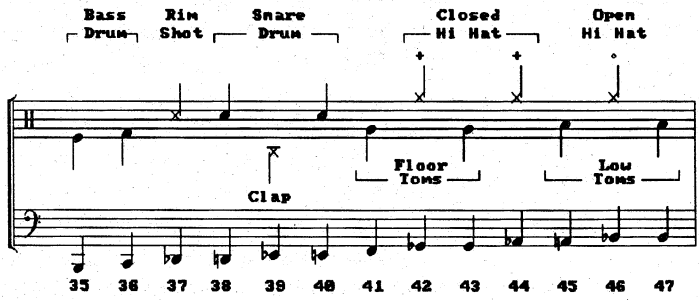
The following table shows which numbers to enter in a PG event to select a program on instruments that use the bank system. The Group A and Group B columns represent another level of program selection used on some Roland instruments. Use the values in the Group A column for synths without this feature.

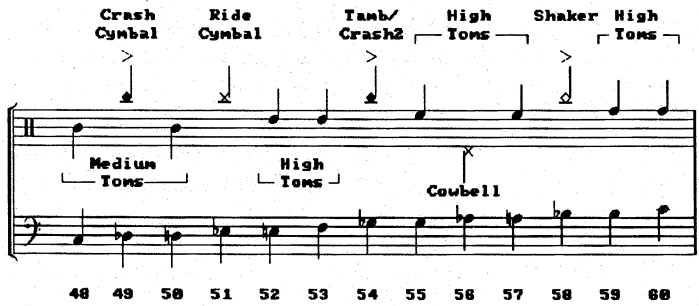
Roland Patch	Group A	Group B
11--18	0--7	64--71
21--28	8--15	72--79
31--38	16--23	80--87
41--48	24--31	88--95
51--58	32--39	96--103
61--68	40--47	104--111
71--78	48--55	112--119
81--88	56--63	120--127

The MIDI implementation chart which comes with each instrument should describe the program numbering scheme for that machine: if not, REXMAN!

MIDI Drums

When drum machines are played through MIDI, each drum is assigned to one or more notes on the MIDI keyboard. While newer machines allow you to assign each drum to a specific note (and possibly to a specific channel as well), there is sort of a quasi-standard in effect regarding drum machine note assignments. These assignments, which are also used in our Copyist transcription program as well as QuickScore, are listed below and on the following page.



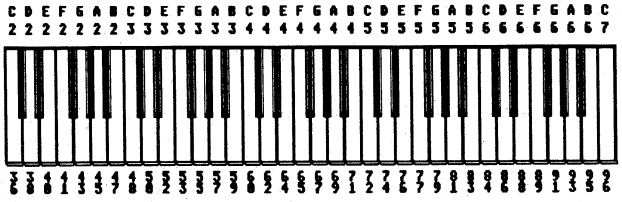


Drum	Note #'s	Notes
Bass	35, 36	B1, C2
Snare	38, 40	D2, E2
Rim	37	C#2
Claps	39	D#2
Floor tom	41, 43	F2, G2
Low tom	45, 47	A2, B2
Mid tom	48, 50	C3, D3
Hi tom	52, 53	E3, F3
Open hi hat	46	A#2
Closed hi hat	42, 44	F#2, G#2
Crash cymbal	49	C#3
Ride cymbal	51	D#3
Tamb/Crash 2	54	F#3
Cowbell	56	G#3
Shaker	58	A#3

Most drum machines only allow one note number to be assigned to a single drum. In this case, use the higher note for any drums which are listed with two numbers.

MIDI Note Numbers

MIDI note numbering is also handled differently by different manufacturers. The note numbering system used by Dr. T's is shown in the chart below, where the keyboard represents a five octave keyboard like those found on most instruments today. Note that the system we use does not coincide with that used by Yamaha. Yamaha designates the lowest key on the five octave keyboard C1, whereas we call that key C2, and Kurzweil calls it C3. Other manufacturers may use any of these systems exclusively, or they may use different systems on different instruments. (Isn't standardization wonderful?)



MIDI Note Numbering

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Chapter 12

Tips For Advanced Users

In the seven years since the release of Version 1.0 of the Commodore 64 KCS, the thousands of musicians who use the program have undoubtedly come up with many thousands of useful techniques, tricks, and shortcuts. Much as we would like to, space does not permit us to present all of them here. This chapter discusses many fundamental KCS techniques which might not be obvious at first, and will hopefully serve as a catalyst for further experimentation.

Control Sequences in OPEN Mode

A sequence which consists of sequence control events (Primary, ST, XX, XL, MS, US, PT, or VT) is called a *control sequence*. You may find it beneficial to record individual sequences or parts of songs and then use control sequences to start them up. This example will start three sequences together and end four measures later.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		A	0	0	1
1-	1:	1	2	0		7	0	0	1
1-	1:	1	3	0		2	-4	0	1
5-	1:	1	4	3840		DE			

When the control sequence which follows is started, sequences A and B immediately start and will play four times. One measure later, sequence 15 (which is a secondary sequence) starts playing for two repetitions. Two measures later, sequence B is forced to shut off, and another two measures later, the TM event will change the tempo to 100 beats/minute.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		B	0	0	4
1-	1:	1	2	0		A	0	0	4
1-	1:	1	3	960		ST	15	0	2
1-	1:	1	4	1920		XX	B		
1-	1:	1	5	1920		TM	100		

Creating Songs with Control Sequences

There are two techniques that we recommend for using control sequences to combine OPEN mode sequences into songs. The first technique involves creating a control sequence that starts other control sequences and waits for each sequence. This sequence controls the segueing of the sections of the piece. The sequences started by this sequence each start the sequences required by their section. In the following example, the song consists of sequence 1, followed by 2, 3 and then 1 again.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		1	0	0	1W
1-	1:	1	2	0		2	0	0	1W
1-	1:	1	3	0		3	0	0	1W
1-	1:	1	4	0		1	0	0	1W

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		A	0	0	1
1-	1:	1	2	0		B	0	0	2
1-	1:	1	3	0		C	0	0	1W
1-	1:	1	4	0		DE			

The second sequence above is sequence 1. Sequences A, B, and C are started together, and sequence 1 waits for sequence C to complete before ending. Sequence B is played twice. When using a structure such as this, you will probably want all parts to play for the same amount of time. In this case, sequence B would be half the length of sequences A and C. The W (Wait) for sequence C prevents the song from continuing to sequence 2 until sequence C has completed. The DE event may look superfluous, but it is necessary to keep sequence 1 from ending after sequence C is started, causing the main control sequence to continue. If you **always end a control sequence that will be started by another control sequence with a DE event**, you will prevent such problems without having to think about what goes on inside the program.

The other technique is to use a single control sequence without waits to "schedule" the starting of other sequences. This has the disadvantage of requiring you to compute and enter the times necessary to get all of the parts to start exactly when you want them to. It has the advantage of complete flexibility. Parts can be started while other parts are still playing, and XX or XL events can be used to stop looping parts without calculating their normal stop points.

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		A	0	0	1
1-	1:	1	2	0		B	0	0	2
1-	1:	1	3	0		C	0	0	1
9-	1:	1	4	7680		B	0	0	2
9-	1:	1	5	0		D	0	0	99
9-	1:	1	6	0		E	0	0	1
13-	1:	1	7	3840		F	0	0	1
13-	1:	1	8	0		XX	D		

This example might be used to play a song with the same beginning as the one in the previous example. Eight bars into the piece, sequence B is started for two more plays. Sequence D, perhaps just a sixteenth note hi hat, is started indefinitely, and sequence E is started for a single play. Four bars after that, sequence D is stopped and sequence F is started. The second method is the one Dr. T usually prefers when he is composing music instead of writing software.

Control Sequences as Real-time Controllers

Many of the KCS's event types which modify the playback of other sequences can be used as real-time controllers themselves, by creating control sequences which perform specific operations on other sequences. For example, suppose that you find that, when creating songs in OPEN mode, you often have a need to mute every part EXCEPT your drum sequences. Assuming that you use channel 16 for your drum parts, enter the following sequences in sequences 91 and 92:

Control Sequences as Real-time Controllers (continued)

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		MS	*1		
1-	1:	1	2	0		MS	*2		
1-	1:	1	3	0		MS	*3		
1-	1:	1	4	0		MS	*4		
1-	1:	1	5	0		MS	*5		
1-	1:	1	6	0		MS	*6		
1-	1:	1	7	0		MS	*7		
1-	1:	1	8	0		MS	*8		
1-	1:	1	9	0		MS	*9		
1-	1:	1	10	0		MS	*10		
1-	1:	1	11	0		MS	*11		
1-	1:	1	12	0		MS	*12		
1-	1:	1	13	0		MS	*13		
1-	1:	1	14	0		MS	*14		
1-	1:	1	15	0		MS	*15		

MSR	-BT:	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1:	1	1	0		US	*1		
1-	1:	1	2	0		US	*2		
1-	1:	1	3	0		US	*3		
1-	1:	1	4	0		US	*4		
1-	1:	1	5	0		US	*5		
1-	1:	1	6	0		US	*6		
1-	1:	1	7	0		US	*7		
1-	1:	1	8	0		US	*8		
1-	1:	1	9	0		US	*9		
1-	1:	1	10	0		US	*10		
1-	1:	1	11	0		US	*11		
1-	1:	1	12	0		US	*12		
1-	1:	1	13	0		US	*13		
1-	1:	1	14	0		US	*14		
1-	1:	1	15	0		US	*15		

Now typing 91 on the numeric keyboard will mute all sequences but those on channel 16. Sequence 92 will return all sequences to their original, unmuted status.

Note that, as with all applications which involve starting OPEN mode sequences from the keyboard, the number of repeats programmed for each control sequence will have a profound effect on the operation of any real-time control sequences. In the preceding example, if sequence 91 is set to loop indefinitely, then all subsequent sequences that start with a channel other than 16 will be muted each time sequence 91 loops, and if sequence 91 is set to loop only once, then sequences that start after sequence 91 is played will not be muted. Generally speaking, real-time control sequences should be set to repeat only once, if predictable effects are to be obtained.

Real-time control sequences can also be used to store long strings of utility commands for your synth setup. For example, if you'd like to experiment with different mixes in OPEN mode, you could program several different combinations of volume (CC 7) settings in a group of sequences, and then select these sequences while your musical sequences loop. In this case, you should be sure that your musical sequences don't contain volume events. Similar things can be done with groups of program changes messages or other CC events that control timbre.

Real-time control sequences can perform more exciting functions than simply muting tracks and selecting mixes, though. Suppose that, for some reason, you'd like to simulate the effect of playing a 33 RPM record at 45 RPM. In this case, you'd need to speed up the sequencer's tempo, while simultaneously transposing each part up by a corresponding amount. The following sequence does just that:

```
MSR -BT:  ST EVNT   TIME   CH  TYP   NOTE   VEL    DUR
1-    1:   1    1      0       AC    372
1-    1:   1    1      0       PT    *        5
```

If you're picky about details, you could program a sequence in which the tempo and pitch transposition are gradually increased, to simulate the flywheel effect caused by the inertia of the turntable. Of course, you will probably want to create a corresponding sequence to return the speed to normal, unless you really enjoy listening to records at the wrong speed.

Additional Control Sequence Techniques

You may wish to create a separate control sequence that contains all of the program changes needed for your song. You might want to put a few steps of rest in this sequence if using the first technique, or start this sequence slightly ahead of the others. The extra time gives the program changes a chance to "settle" before any notes are played.

You may wish to set up the basic structure of your song using either of the above techniques, and then use the **Record with Cue** feature to add additional parts which can start at any point in the sequence. You must then add a sequence start event (without a WAIT) for each new sequence at the beginning of the main control sequence. Dr. T frequently uses this technique to overdub continuous controller information after the basic piece is completed.

Syncing to Tape

If you are using an FSK sync to tape box such as the Roland SBX80, we suggest that you mute all tracks, sequences, or channels when you stripe the tape. The reason for this is that, when the sequencer is playing a full set of sequences, the MIDI data stream is pretty busy, and the timing of individual clock messages may be affected slightly. By muting all sequences, we allow the computer to function strictly as a very expensive but deadly accurate MIDI clock source, which is all that is needed when laying down a sync tone. However, be sure not to mute the conductor track in TRACK mode, or any OPEN mode sequences that contain TM, AC, or DC events, as this will eliminate all your tempo changes from the sync track!

The exact procedure for recording a sync tone will depend on your sync box, but the basic method is as follows. First, set up the sequencer as described above, then start the tape recorder. After it has run for a bit, start the sequencer. When the song has finished, stop the recorder and rewind the tape. (You might want to let the clock run on for a while after the song ends, in case you decide to lengthen the song later.) Now unmute all the previously muted tracks or sequences, set the sequencer's clock source to **MIDI** (or **MIDI w Song Pointer**, if your sync box supports this feature) on the Environment screen, and patch the MIDI clock output from the sync box into the computer's MIDI input. From here on, everything should function as described in your sync box manual.

SMPTE synchronization, while more advanced than a simple FSK clock, is much simpler to use. The documentation included with the Phantom will tell you everything you need to know about SMPTE.

Suggestions on Timing Resolution

The Keyboard Controlled Sequencer defaults to a resolution of 240 steps/beat. This corresponds to clocks that are separated by about two milliseconds at a tempo of 120 beats/minute. The program allows you to increase the steps/beat value up to 384, but there are several reasons that we recommend a value no higher than 240.

Given that it takes one millisecond to send most MIDI messages, and that no instruments will respond instantly, setting the time between clock steps to one or two milliseconds does not give you as much increased resolution as you might think. A higher resolution creates larger time and duration values which are more difficult to edit.

Other disadvantages stem from the design of the KCS. The program was designed to use the time between clock steps to do work to get ready for the next time step. If the time steps are too close together, the program will not always be able to do this work. The program was also designed to play the lower numbered tracks or sequences before the higher numbered. This order is preserved even when tracks are copied to a sequence. You can thus improve timing of critical parts by putting them on the lowest numbered tracks or sequences. If the time steps are so close together that the program has not finished with the previous time step before it is supposed to start the next, this advantage will be lost.

Suggestions on Timing Resolution (continued)

When in TRACK mode, timing accuracy may be affected slightly by mouse movement and placement. Generally speaking, if you have critical timing requirements, you should avoid moving the mouse while in TRACK mode, and keep the mouse away from any active display areas on the screen, such as the measure/beat/step counter or the activity displays. We have never found a need to do this, but if you are a perfectionist and are working with a high resolution clock, these steps may be helpful.

The play timer is derived from the same clock used to step through the sequencer. Thus, when an external clock is in use, the program has no direct knowledge of the tempo--so the calculations used to maintain the play timer are based on the TM, AC, and DC events within a sequence. This might seem to be an inherently inaccurate method for calculating the time, but as long as the external clock source is an FSK or similar sync signal *that was laid down using the same tempo changes*, the results are excellent. In our measurements, we have found the accuracy of this method to be around one second in four hours using the same computer as the clock source, though in real life the accuracy of the clock will be limited by the accuracy of the tape deck's motors. The tempo events in a piece are also used to calculate the play timer value when chasing a cue point, either in response to a MIDI song pointer message or to selecting a "play from cue" operation, and to interpolate between MIDI clocks when synchronizing to an external 24 PPQN clock (for instance) while using a higher internal clock resolution. Since MIDI song pointer messages are quantized in units of six clock steps, the time and tempo calculation routines used for these purposes by the KCS expect to see TM, AC, and DC events auto-corrected to a six step grid. Otherwise, timing inaccuracies will result. When synchronizing to a SMPTE source via the Phantom, the play timer is taken directly from the SMPTE signal.

The longest single rest (DE event) that the program can record is 65535 steps, which corresponds to about 68 bars at 960 steps/measure. If you are recording a part that begins more than this number of steps into a track, the part will play 65536 steps earlier than you expect, and you will have to put extra rests in from the Edit screen.

Using Multiple Outputs

KCS version 4.0 has the ability to split its MIDI output to up to four separate MIDI outputs simultaneously. Because each sequence or track can be directed to play only on a specific output, this means that number of effective MIDI channels in your system is multiplied by the number of outputs in use--for up to 64 separate MIDI channels!

The system's MIDI outputs are designated with the letters A through D, with A being the ST's built-in MIDI port. If you're using the Phantom, its MIDI port is port B, or if you're using C-Lab's Export MIDI interface, its ports are B through D.

The KCS cannot automatically sense how many output ports are in use; you must tell it how many are available with **Output Ports** parameter on the Environment screen. This value is saved and loaded with .ENV (environment) files, but NOT with .ALL files, so that you can load older .ALL files without messing up the port count. We suggest that, after you set the **Output Ports** parameter, you save a new copy of DEFAULT.ENV.

Once the number of output ports is set, you may assign any sequence or track to a particular MIDI output with the **Output Port...** option in the Edit screen's **Options** menu. (These port settings are saved with .ALL files, but not with individual .SEQ files.) Note that the output port of a control sequence that does not contain any MIDI data is irrelevant; any sequences started from such a control sequence will play back through their assigned outputs.

Using Multiple Outputs (continued)

The **Output Map...** option in the **Environment** menu is used to determine which outputs will be used when recording and merging. This edit window is described on page 130.

For several reasons, the timing of the original MIDI output (port A) is marginally better than that of the expansion ports. We suggest that you use port A for MIDI clock signals, drum parts, and your most frequently used synths and samplers, and use the other outputs more sparingly. We should also note, for the record, that the timing differences between the outputs will be inaudible in most circumstances.

Sending System Exclusive Messages

System exclusive messages, which most MIDI hardware manufacturers use to communicate patch data and other non-standard message types, can be sent from the KCS using single byte events.

For many shorter messages, the single byte events can be simply inserted in the sequence without any adjustments to the remainder of the sequence, but for longer messages such as data dumps, it may be necessary to add time to the sequence after the message, to allow the KCS to "settle". For example, it takes about one second to send a 3000 byte sysex message. This message should all be sent on one time step (that is, each event in the message should have a TIME value of zero) since the receiving instrument may react strangely if delays are inserted into the message. While the message is being sent, the sequencer is accumulating a "backlog" of other messages to be sent (MIDI clocks, note messages, etc.), which will all be sent immediately after the sysex message as the sequencer tries to catch up with itself. For this reason, it's a good idea to put a dead space, with no activity in either the sequence itself or any synchronized instruments, in the immediately following any large sysex messages.

The KCS can directly record system exclusive messages of up to 5000 bytes if the **Sysex** button on the Environment page is active. Sometimes bulk dumps (which may be longer than this limit) may consist of a series of shorter sysex messages. These will be recorded properly if each individual message does not exceed this limit. For the most complete support of system exclusive data, we recommend XOR, our universal system exclusive orchestrator.

To record a sysex data dump from a MIDI instrument, turn on the **Sysex** button on the Environment screen, and select an OPEN mode sequence for recording. Following the instructions in your instrument's manual, initiate a data dump from the instrument's front panel. If everything is working properly, the sequencer will start to record immediately, and the word **SYSEX** will appear on the screen as the name for that sequence. The sequencer's clock may pause momentarily while long data dumps are being recorded.

If you have an instrument that does not allow sending sysex data dumps directly from its front panel, it may be possible to initiate a data dump by sending a "dump request" message to the instrument from the OPEN mode record screen, while recording the data dump in an OPEN mode sequence. Be sure that your dump request sequence is set to play only once; otherwise, strange behavior will certainly result. Synths which require handshaking during sysex dumps, such as Casio and some Roland instruments, will need to have delays inserted at certain points in the dump request. See your owner's manuals for details on dump requests, and please don't call us for help with specific instruments!

Transferring Sequences from Other Sequencers

If you are upgrading to the Keyboard Controlled Sequencer from a less powerful hardware or software sequencer, you might be wondering if you will have to redo all the work you've done on your old sequencer, to play the same music on the KCS. Fortunately, transferring sequences into the KCS from another instrument is quite simple. Essentially, we treat the older sequencer as a keyboard player with a built in MIDI clock, and let it play into the KCS while we record.

First, set the external sequencer to send MIDI clock, and disable looping, if possible. If you can't turn looping off on the external sequencer, make sure you have a blank sequence available in that machine. The tempo of the external sequencer can usually be set to its maximum value with no problems, which is handy if you have a lot of sequences to transfer; but be careful when transferring dense music, since minor timing discrepancies might occur due to MIDI data logjams.

On the KCS, set the clock source to MIDI, enable the recording of controllers and aftertouch, and turn **MIDI Merge** on in the Environment screen. **Rechannelize** should be off, and you will probably want to leave **Filter** off as well, unless you want to record one channel at a time. **Quantize** should be off, and **Align** should be on.

Now go to the TRACK or OPEN mode record screen, as you prefer, and you are ready to record material from the original sequencer. If recording in TRACK mode, be sure not to set the length of all tracks. You can either record a single sequence, pattern, whatever, from the external device, or an entire song. We usually prefer to record single sequences from the external device in OPEN mode, and then string them together using control sequences. Once a sequence is recorded in OPEN mode, it is a simple matter to break it into individual channels by copying the sequence to TRACK mode.

When you enter the record screen, ensure that recording is enabled and press <F10> or the <Space bar> to start recording. The KCS will wait for a start signal from the external sequencer. Start your song or sequence on the external sequencer, and data on all 16 MIDI channels will be recorded by the KCS. If looping is disabled on the older sequencer, then a stop signal will be sent at the end of the sequence and recording will cease. If looping is turned on, then select the blank sequence mentioned earlier after starting the external sequencer. On most machines, this will cause the blank sequence to start as soon as the first sequence is finished. Stop both sequencers after the blank sequence starts. In this case, you will undoubtedly need to remove some time from the end of the recorded sequence or track, to compensate for recording part of the blank sequence. In either case, you may also need to make slight adjustments to the timing of the first event of the track or sequence.

Since drum machines are nothing but stripped down sequencers with built in sounds, drum patterns can be transferred to the sequencer in the same way. This allows you to keep all of your drum parts on the same disk as the rest of a song.

For more information on transferring sequences between two instruments, see the December 1986 issue of Music Technology.

Loopback Recording

Loopback recording is an extension of the idea of transferring sequences from another sequencer; but in this case, the external device is replaced by a previously recorded track or sequence in the KCS itself. This might seem like a strange notion at first, but there are a number of applications for this technique. For example, loopback recording can be used to reduce a complex control sequence to a single sequence for use within a song, or for capturing a performance using the interactive play features of TRACK or OPEN modes.

Loopback Recording (continued)

To set up for loopback recording, connect the computer's MIDI in jack to its own MIDI out, either directly or through a merger. Set the clock source to **Internal Clk. Rechannelize** and **MIDI Merge** must very definitely be turned off, and **Mute New Tracks** should be on if you're in TRACK mode. You will need to turn **Filter** on if you want to record on only one channel while listening to all channels.

From here, the procedure is the same as recording from a keyboard, except that the KCS is providing the keyboard player. Simply turn on recording in the KCS, then start the sequencer. One way to use this technique would be to bounce portions of several tracks down to one track, while muting and unmuting the individual tracks as needed. The result would be a single track which contains only the portions of the other tracks that you want to keep. You could double portions of a track using loopback recording by muting the track in the appropriate places, and then merging the new track with the original. In OPEN mode, loopback recording can be used to reduce a song, which may have evolved from a few simple sequences to an ungainly collection of looped and unlooped control sequences interspersed with XX, XL, and other events, to a more manageable single sequence. If you prefer to create songs in real-time by starting and stopping sequences from the keyboard, loopback recording can be used to capture such a performance.

The velocity pedal feature of OPEN and TRACK modes was designed specifically for use with this technique. As a sequence or track is played, it is re-recorded in another sequence or track with velocity values processed by the velocity pedal. When doing this, you will need to set the filter channel to the channel of the sequence or track that is being processed with the velocity pedal, so that only that channel is recorded.

Chapter 13

Trouble-shooting

While MIDI is one of the most successful and consistent interfacing standards in the computer industry, it is still possible that certain types of equipment won't work well together. Many times, what might seem like a perfectly reasonable configuration won't give the expected results. This could be because you are trying to use a feature which is not implemented on a particular machine, or because you haven't initialized your synths correctly, or for many other reasons.

When you get into a situation like this, a MIDI data display program can be very helpful. You can then determine if a piece of equipment is doing what it is supposed to do, or if the problem lies elsewhere. A MIDI display program for the Commodore 64 was published in the September 1986 issue of Electronic Musician, and instructions for adapting this program to the ST appeared in the June 1987 issue. We're sorry, but Dr. T's can only answer questions directly regarding the operation of our software, and not questions regarding the idiosyncrasies of a particular piece of equipment. See Appendix 1 for further information on customer support.

There are two general approaches that are useful when troubleshooting a complex system. You can attempt to isolate the source of the trouble by changing one aspect of the system at a time, or you can simplify the system by using fewer pieces of equipment or program features. If you are using a very complex MIDI system organized around a central MIDI switcher, you should always **disconnect the MIDI switcher** before attempting to troubleshoot your system. We have found that the advanced capabilities of many of today's switchers (merging, filtering, transposition, etc.) are often the source of many problems, especially if their operation is not fully understood.

The remainder of this chapter outlines solutions to various common problems.

Program Gives Errors on Loading

Does the computer load other programs? If so, you might have a bad disk, or your computer's disk drive may be going out of alignment. Try your program disk on another computer (your dealer's or a friend's), and if it still won't work, contact Dr. T's to arrange for a replacement disk. DO NOT send back your disk without contacting Dr. T's for a return authorization number. Returned products which do not display such a number on the outside of the package will be returned to the sender. And remember, NEVER save your data files on your KCS program disk!

Some Desk Accessories Cause Problems

Alas, due to the multitude of programming styles among ST programmers, many desk accessories are not compatible with all programs. Certain desk accessories may cause the KCS to crash, and others may still be active even though they are not visible on the screen. We suggest that you thoroughly test your DA's with the KCS before using them in a demanding situation.

If desk accessories disappear, or if you have problems moving them, they can often be made to reappear by moving the mouse into the menu, or by selecting the DA from the **Desk** menu once or twice.

MPE Programs Will Not Load or Disk Errors Occur When Loading or Saving Files

We have discovered that some versions of the ST's operating system have problems with folders whose names are more than seven letters long. We're not sure why this happens, but if you restrict your folder names to seven letters or less, everything will be fine.

Bogus "No More Room For External Programs" Errors

This message may occur after you've tossed out one MPE program when you attempt to load another, if the KCS.INF file is either not in the proper folder, or if the amount of memory allocated in its first line is not large enough. This file should be in the same folder as your KCS program (KCS40.PRG or LEVEL2.PRG.) If it is, try increasing its size.

MPE Programs Can't Load Resource Files

This may occur if the file KCS.INF is not set up properly. See the previous paragraph for corrective steps.

Programs Executed After Leaving the KCS Crash

If you quit the KCS by turning the computer off or pressing the reset button, you will usually see a string of bombs across the screen when you attempt to run another program. This is because the KCS leaves certain ST system variables in a weird state if the program is not terminated with the **Quit** menu item. These variables are not re-initialized by the reset procedure, so you must quit the KCS with **Quit** in order to avoid problems.

Computer Appears to be Dead

Adjust your monitor settings, and check for a loose monitor cable. Is the disk drive on and is the drive cable OK? Is the mouse properly inserted in the correct jack? Try turning the computer's power off for at least 15 seconds, then re-boot. This forces the computer to completely clear its memory.

Event Numbers Seem to be Incorrect

Remember, the **EVNT** field only goes to 9999. Events greater than 9999 are displayed without the first digit, that is, as numbers from 0 to 9999.

Instruments Do Not Respond

First check to see that all your MIDI cables are connected properly, that data reception is enabled on each instrument, and that the correct channel assignments are being used.

If nothing plays at all, the program might be set to sync to a nonexistent external clock. Check the clock source on the Environment screen.

The program may have crashed. Save your files (if possible), remove the disk, power down or reset the computer (wait about 20 seconds before turning it back on), and then run the program again.

If a sequence or track that you've just finished recording won't play back, use the Edit screen to confirm that you have actually recorded data, and that it's on the right channel. Check your master synth, as well as the **Rechannelize** and **Filter** settings on the Environment screen if not.

Continuous Controllers are Recorded Incorrectly

Occasionally, a long string of continuous controller messages, such as pitch bend or the modulation wheel, may be recorded as a string of program changes or other incorrect message types. This happens if the instrument used for recording employs running status, and recording is turned on after the start of the controller motion. When running status is used, a MIDI status byte is sent only at the start of the controller motion, rather than with each individual message, and if recording is enabled after this single status byte is sent, the KCS (or any MIDI device, for that matter) will not interpret the subsequent data correctly. If this happens, simply re-record the controller data, but play a single note before moving the controller. This ensures that a status byte will be sent at the beginning of the controller motion, and the note can be easily removed on the Edit screen. Note that changing the **Running Status** switch on the Environment screen of the KCS will not help with this problem.

Sequencer Plays Back, but Notes are Garbled

Are notes overlapping improperly? If an instrument is in mono mode and notes overlap, the instrument may not retrigger its envelopes. If an instrument is in poly mode and notes of the same pitch overlap, undesirable results might occur. If a note ends and a new note begins in the same time step, the new note will start before the old one ends, causing an overlap.

Sending program changes too close to a note-on or off message can cause missing or stuck notes on some synths. Try moving any program changes in the area of the affected notes.

If you're using a multi-timbral synth that uses dynamic voice allocation, such as an ESQ-1, VFX, MT-32, or D-110, notes may be chopped off if you exceed the maximum number of voices or partials that the instrument can handle. The solutions for this will vary from one instrument to the next. Try adjusting the "partial reserve" setting on the Roland instruments, or the "voice priority" parameter in the VFX. On the sequence end of things, this problem can often be fixed by eliminating any overlapping notes from the sequence, or by thinning out redundant notes. A more drastic solution would be to buy more synthesizers; however, this may lead to another problem, called "spousal priority conflict", in which your significant other refuses to acknowledge requests and/or commands. Please do not call us for help with this problem.

Strange Transposition Occurs in OPEN Mode

This may happen if an OPEN mode sequence contains a dangling pitch bend. When using PB events in a sequence, you should always ensure that the last PB event has a value of zero. Otherwise, parts played on that channel by following sequences will appear to be improperly transposed.

Synthesizers Spit Out Notes at High Speed

If you loop an OPEN mode sequence that contains one or more MIDI events, all with times of zero, the program will send these MIDI events as fast as it can, causing your synthesizer to sound as if it's going haywire. If you loop a control sequence of length zero, and the control sequence does not have a WAIT programmed, that sequence will keep restarting all of the sequences it is controlling, and they will keep replaying their first notes. Don't loop any sequence whose times are all zero, unless it has a WAIT programmed and a DE event at the end. A MIDI loop condition, where the computer's MIDI out is fed back to its own MIDI in through a merger, can also cause this to occur.

Cue Doesn't Work in TRACK Mode

If nothing has been recorded on track 1, the length of that track is zero. Consequently, no cue start points can be set, and clicking on **CUE** will have no effect. Use **PLAY** to start the sequencer, or set the length of track 1 on the Edit screen, and then set your cue points.

Instrument Sends Data, but Doesn't Receive

The instrument may not be set to receive on the MIDI channel that it is sending on. Are your MIDI cables good? Some sync cables look like MIDI cables, but won't work properly for MIDI. Check that the synth's MIDI receive channel is the same as its send channel, and that **Rechannelize** and **Filter** are set properly.

MIDI Controllers Are Not Recorded

Is the **Controllers** button on the Environment screen highlighted? Does this instrument send and receive the controllers you're using? Some early MIDI synths, such as the Roland Jupiter 6, won't send control changes over MIDI. Others, like the Prophet 600, must have controllers enabled from the front panel each time the synth is turned on. Early DX7s sent aftertouch as controller 3. Also, some Roland instruments have sustain pedal problems.

Some MIDI Data is Not Recorded

Due to a bug in the Atari ST's operating system, it is possible for MIDI data to be lost when the mouse is moved. This doesn't happen very often, but it does happen. To prevent this, we suggest that you not touch the mouse when recording. (Turning the mouse upside down while recording is a good way to keep from moving it accidentally.)

Sequencer and Drum Machine Go Out Of Sync

This can occur if the length of a sequence in OPEN mode or of track 1 in TRACK mode is not a multiple of the length of the drum box pattern. Check to make sure that the sequence ends on the first step of a measure, rather than step 960 or some other nearby value.

If you do not use the **Align** feature while recording, you will almost always end the recording process a little before or after the end of a measure. On playback each loop will put the sequence further out of sync. When using **Align**, you must press the <F10> key during the last measure that you wish to record. Pressing <F10> a fraction of a beat into the next measure will force the program to continue recording for another entire measure, even if you do not play any notes. Clicking on **STOP** or pressing <F1> immediately stops recording and defeats the **Align** feature.

If a drum box is synced to the program via MIDI, it may lose timing clock information if too much MIDI information is being sent. As the piece progresses the drum machine will go further out of sync. Does the drum keep sync when only playing a few sequences? Does it play better if no sequences with PB, AT or CC events are running? Selecting **Running Status** on the Environment screen may help. Other ways around this are to use the drum machine as the master, or to have the KCS play the drums instead of sending time to the drum machine to play its own patterns.

Synths Not Accepting Program Changes

Some synthesizers, for example Sequential's earliest instruments, power up in a mode in which they do not accept program changes via MIDI. Your synthesizer manual should contain instructions on how to make them accept program changes. Many instruments only accept a limited range of program numbers, and reject all others.

Wrong Programs are Selected

MIDI hardware manufacturers use several different numbering schemes for program change messages. We use a single numbering system, so ours may not always match that of others. See the section on program changes on page 171 for details.

A Programmed Wait Does Not Occur

Sequences which call other sequences and use the WAIT feature should have a DE event with a time of zero for the last event. If you do not do this, you will encounter problems when you try to chain this sequence into a higher level control sequence.

Noticeable Time Delays Occur When Sequences Start or Loop

The computer is a powerful, but finite tool. If you attempt to play several sequences simultaneously, which in turn each play a lot of notes simultaneously, the computer may lag. If this occurs, rearrange your sequence structure to reduce the amount of work the computer has to do in one time step. Edit the timing so that not as many sequence start events occur at the same time.

Most instruments will react strangely if you try to send a patch change and play a note in the same time step. See the note on program changes under **Sequencer Plays Back, But Notes Are Garbled.**

Synthesizer Not Functioning in Multi-Timbral Mode

Some multi-timbral synthesizers (the CZ-101, for example) power up in poly mode. To use the multi-timbral feature, you must set them to mono mode, either through MIDI (see Chapter 11) or by following the instructions in your owner's manual. If your master keyboard can only transmit on its basic channel, you may need to turn local control off and use **Rechannelize** to record in real-time.

Undo Doesn't Seem to Work

If you use the <Undo> key or **Undo** edit option immediately after selecting a sequence or track for editing, it will usually bring up something that has no relation to the material that was originally in that sequence. The reason for this is that the KCS updates the undo buffer (sequence Z) only when a change is made to the current sequence or track. When you jump to the new track or sequence, the undo buffer contains a copy of the last edited track or sequence, so clicking on **Undo** brings up that data, rather than anything related to the new sequence or track.

Standard MIDI Files Don't Play Past First Step

This can happen if the KCS does not convert the MIDI file's conductor track properly. You can fix this by editing track 1. Make sure that it is as long as the longest track, by adding one or more DE events to the end of the sequence.

SMPTE Sync Fails

This will happen if you are using the Phantom for SMPTE synchronization, with the **MIDI Outputs** parameter on the Environment screen set to 3 or 4. Set it to 2 to fix the problem.

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Appendix 1

Service and Support

This program and the associated documentation are copyright 1986, 1987, 1988, 1989 and 1990 by Emile Tobenfeld. This program is licensed to be used on a single machine. It may not be copied without explicit written permission. If the program is transferred to another party, all backup copies must be transferred at the same time, or destroyed. This notice of copyright must be transferred if you transfer the program, and your license to use the program is terminated on transfer.

The diskette on which the program is furnished is warranted for ninety (90) days from the date of delivery. The program is not guaranteed to meet your requirements, and operation of the program is not guaranteed to be uninterrupted or error free. **In no event will Emile Tobenfeld or Dr. T's Music Software be liable for any damages, including any lost savings, lost profits, or other incidental or consequential damages arising out of the use or inability to use this program, even if we have been advised of the possibility of damages. Dr. T's Music Software and Emile Tobenfeld shall not be responsible for any damages claimed by any other party, resulting from the use or attempted use of this program.** All warranties implied are with Dr. T's, not your local dealer. If problems arise, call Dr. T's directly.

Copy Protection and Backups

The disk containing the KCS is copy protected, and must be inserted in drive A when running the program from either the hard or floppy disk. We regret the necessity for copy protection, but experience has shown this to be the only way to deal with unauthorized distribution of our programs. **Software "piracy" is a crime and deprives your fellow artists of their rightful income.** Because of this problem, we are much more fun to deal with if we have your completed warranty card in our hands when you call for technical support.

A single backup key disk will be sent to you, at no charge, when you send in your warranty registration card. You must include either your completed warranty card or your diskette serial number and a copy of the sales receipt with your request for a backup. There is a $15 charge for the replacement of program disks that become defective more than 90 days after the date of purchase. We will only send one backup disk to each customer, and you will be required to return either your backup or original disk when ordering updates or replacement disks.

When returning disks for replacement or updates, **please send the disk by UPS, Federal Express, Express Mail, or some other service that will allow you to trace the shipment.** We're sorry, but we cannot be held responsible for packages sent via regular US mail.

Dr. T's reserves the right to make improvements to the program without notice, and to make what we consider to be reasonable charges for updates.

What To Do If Problems Arise

If you have problems with the KCS that you are unable to solve with the help of the manual, Dr. T's maintains a customer service line staffed by experienced MIDI musicians. We are happy to help you with questions regarding the KCS and any of our other programs, but due to the incredible variety of MIDI products available today, **we cannot answer questions regarding other manufacturer's hardware or software, including questions on the basic operation of GEM, the Atari ST, or any other computers or musical instruments.**

When calling Dr. T's for customer service, there are a number of things that you can do to help us help you, which can also save you money on your long distance bill. Here is a check list of things to have ready when calling Dr. T's:

1--Your diskette registration number
2--Your manual
3--Computer turned on and KCS booted
4--Any data related to the problem
5--Information on your computer's disk configuration, monitor type, printer type, etc.
6--Paper and pencil

When you call us, we will walk you through the program and ask you questions about what happens, so it is very important that you have this material at hand when calling. If you don't have this ready, we will ask you to call back later with the required information. After you've completed the checklist, call us at **(617) 455-1458** between 10 AM and 4 PM Eastern Standard Time, Monday through Friday.

Another option is to fax us your question. Our fax number is (617) 455-1460. Usually we can respond to your fax in a day or so.

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Appendix 2

Command Key Reference Lists

The next few pages contain reference lists of the keyboard functions on the TRACK and OPEN mode play and record screens, and the step-time record screen. You may make copies of these pages and keep the copies close at hand when using the KCS, if you like.

TRACK MODE PLAY/RECORD SCREEN

TRACK SELECT KEYS

<1--9>	: Tracks 1--9
<A--Z>	: Tracks 10--35
<Numeric 1--9>	: Tracks 36--44
<Numeric (>	: Track 45
<Numeric)>	: Track 46
<Numeric />	: Track 47
<Numeric *>	: Track 48

LIVE EDIT

<Right Shift>	: Delete Notes
<Control>	: Restore Notes
<Alternate>	: Vel = 127
<Left Shift>	: Vel = 64
<Alt-L. Shift>	: Vel = 16

If VELOCITY PEDAL is active while LIVE EDIT is on, pressing <Alternate> will set all note velocities from the velocity pedal.

CONTROL PANEL

<F1>	: Exit
<F2>	: Record
<F10>	: Play/Record
<Space>	: Play/Record
<Esc>	: Pause
<Enter>	: Stop
<.>	: Tempo Up
<,>	: Tempo Down
<Undo>	: R-Rec
<?>	: X-Last
<Numeric +>	: F-Fwd
<Numeric ->	: Rewind
<:>	: Controllers
<'>	: Aftertouch
<">	: Note Off Vel
<;>	: MIDI Merge
<Backspace>	: Rechn
<>>	: Rechn Chan Up
<<>	: Rechn Chan Down
<Tab>	: Cue
<Crsr Up>	: Start Cue Up
<Crsr Down>	: Start Cue Down
<Crsr Right>	: End Cue Up
<Crsr Left>	: End Cue Down
<Alt 1--6>	: Cue Loops 1--6

TRACK MODE PLAY/RECORD SCREEN

TRACK FUNCTIONS

<F3>	: Mute/Unmute
<F4>	: Set Punch
<F5>	: Clear Punch
<F6>	: Erase Punch
<F7>	: Copy Punch
<F8>	: Solo
<F9>	: Set Switch
<F11>	: Shift +1
<F12>	: Shift +3
<F13>	: Shift +12
<F14>	: Shift -1
<F15>	: Shift -3
<F16>	: Shift -12
<F17>	: Edit Select
<F18>	: Swap
<F20>	: Name
<Clr/Home>	: Erase
<Alternate>	: Mute Only
<Shift>	: Unmute Only

HIDDEN CONTROLS

<Delete>	: Align
<Return>	: Track Switch
<\>	: Track Merge
<|>	: Auto-record
<%>	: Visible Metronome
<$>	: Audible Metronome
<!>	: All Tracks To Seq
<^>	: Tempo Chg By Ratio
<&>	: Step Display
<#>	: Mute All Tracks
<@>	: Unmute All Tracks
<*>	: Live Edit/Punch Buttons
<->	: Silent Punch
</>	: Cue Loop
<]>	: Cue Back 1 Bar
<[>	: Cue Back 2 Bars
<'>	: Cue Back 4 Bars
<=>	: Cue Back 8 Bars
<Insert>	: Cue Move Amount
<(>	: Track Loop
<)>	: Filter
<_>	: Filter Chan Down
<+>	: Filter Chan Up
<F19>	: Velocity Pedal
<~>	: Panic Button
<0>	: Environment

OPEN MODE PLAY/RECORD SCREEN

SEQUENCE KEYS

<1--9, A--Z>	: Primary Sequences
<Num. 00--92>	: Secondary Sequences
<Numeric *>	: Bank Lock On
<Numeric (>	: Bank Lock Off

Pressing a sequence key will start that sequence looping. If a sequence is playing and is not in its last loop, pressing the sequence key will put it in its last loop. If a sequence is in its last loop, pressing its key will stop that sequence immediately.

Pressing <Shift> and a primary sequence key will mute that sequence.

HIDDEN CONTROLS

<F1>	: Exit
Left Mouse	: Exit
<Esc>	: Pause
<Delete>	: Align
<Enter>	: Record Immediate
<Return>	: Record On Next Event
<.>	: Tempo Up
<,>	: Tempo Down
<Undo>	: Re-record /Cancel
<F10>	: Start/End Record
<Space>	: Start/End Record
<:>	: Controllers
<'>	: Aftertouch
<">	: Note Off Vel
<;>	: MIDI Merge
<Backspace>	: Rechn
<>>	: Rechn Chan Up
<<>	: Rechn Chan Down
<Tab>	: Cue
<Crsr Up>	: Cue Point Up
<Crsr Down>	: Cue Point Down
<Crsr Right>	: Cue Seq Up
<Crsr Left>	: Cue Seq Down
<Insert>	: Cue Move Amount
<0>	: Environment
<~>	: Panic Button

STEP-TIME RECORD SCREEN

SELECT KEYS

<0--9>	: Time
<A--E>	: Time
<F--T>	: Duration
<U--Z>	: Velocity

A new value may be entered for any select key by pressing <Shift> and that key.

PLAY OPTIONS

<F6>	: Play Track/Seq.
<F7>	: Play Last 24 Notes
<F8>	: Play Last 8 Notes
<F9>	: Play Last 8 Bars
<F10>	: Play Last 2 Bars
<Space>	: Play Last 2 Bars
<Tab>	: Play Last Cue

If the sequencer is playing in step-time record, pressing <F10> or <Space> will restart the sequencer.

CONTROL PANEL

<F1>	: Exit To Edit
<F2>	: Exit To Play
<F3>	: Rest
<F4>	: Dur Follow
<F5>	: Audition Vel
<Return>	: Tie
<Undo>	: Delete Last Step
</>	: Time Change Delay
<Esc>	: Pause
<;>	: MIDI Merge
<Backspace>	: Rechn
<>>	: Rechn Chan Up
<<>	: Rechn Chan Down
<Crsr Up>	: Dur Adjust +4
<Crsr Down>	: Dur Adjust -4
<Crsr Right>	: Dur Adjust +1
<Crsr Left>	: Dur Adjust -1
<~>	: Panic Button

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Appendix 3

Version 4.0 Changes

If you've been using the KCS for a while, you may have noticed that this version has many new features, and that several old features have been substantially changed. Rather than force you to hunt through the manual looking for all of these changes, we've summarized them here, so you can get back up to your normal level of productivity in the fastest possible time.

Multiple Output Ports

The big news is the addition of support for multiple output ports, using either our Phantom SMPTE synchronizer, or C-Lab's Export interface. Each track or sequence can be assigned to any output, which means you can now control up to 64 independent MIDI channels. See pages 183 and 130 for more details.

The new output port scheme has implications which affect rechannelization, MIDI merging, and the **Seq to All Tracks** and **All Tracks to Seq** functions. Be sure to reread these parts of the manual.

SONG Mode

By popular demand, SONG mode is now history. In its place, we now give you a separate MPE program called Song Editor, which provides a Tiger-like graphic editing interface. This is described in a separate manual. Old .SNG files can be converted for use in the Song Editor; this is described in that document.

MPE

The MPE has also undergone substantial improvement. It is now possible to automatically load a group of MPE programs when you start the KCS. An additional set of utility programs also lets you load non-MPE programs and run them from the KCS. See the readme files on the disks for more info.

Other Changes

Substantial timing improvements have been made in the program. Because of these, the old **MIDI Slow** feature has been removed.

Owners of large systems, rejoice. It is now possible to designate several drum channels, rather than just one.

It is now possible to install the KCS as an application on the GEM Desktop, so that you may automatically run the program by clicking on any .ALL file. This is done by selecting **Install Application...** from the Desktop menu after high lighting the KCS.PRG or LEVEL2.PRG files in the file selector, and entering .ALL as the file type. Don't forget to save the Desktop after making this change.

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